

PART C. SURFACE WATER MONITORING AND ASSESSMENT**C.1 Monitoring Program*****Purpose of the Monitoring Program***

The Water Quality Planning Bureau (WQPB) is responsible for:

- ☐ The collection and analysis of physical, chemical, and biological data to develop abatement and control priorities, including assessment of beneficial use support of state waters, and report this information to the public through this integrated water quality report⁵⁹.
- ☐ The development and review of water quality standards, total maximum daily loads, and implementation strategies for those waters that required a TMDL.

To satisfy the purpose and intent of the CWA, the WQPB established a general monitoring strategy that considered CWA requirements along with constraints as a result of the 2002 Settlement Agreement.

For the period 2002-2006, the WQPB strategy to satisfy its responsibility under the CWA was greatly influenced by the 2002 Settlement Agreement. The Settlement Agreement required that waters de-listed in 2000⁶⁰ due to the Montana Water Quality Act (MWQA) sufficient credible data provisions [MCA 75-5-702(6)] are completed for the publication of this 2006 integrated 303(d)/305(b) water quality report.

The court schedule, coupled with the state requirement to achieve sufficient and credible data for listing decisions, and the large number of waterbodies (497) on the reassessment list, required a focusing of WQPB resources toward the reassessment project. However, other monitoring projects were necessary to continue, requiring alternate resources to be identified and applied.

Therefore the monitoring strategy for the period 2002-2006 was to focus the Water Quality Monitoring Section (WQMS) staff on reassessment project (CWA section 303(d) monitoring) using a predefined targeted sampling design, and to coordinate and collaborate with alternate resources to continue non-reassessment monitoring

Monitoring Goals

The 2004 - 2006 monitoring strategy was implemented by establishing goals that provided coordination and collaboration between the different projects. The goals were:

- ☐ To complete the reassessment project by 2006 with assistance from EPA Region 8
- ☐ To continue and expand a baseline lake monitoring program in collaboration with the University of Montana
- ☐ To continue and expand a baseline reference sites monitoring in collaboration with the University of Montana
- ☐ To complete sampling for the Environmental Monitoring and Assessment program (EMAP)
- ☐ To develop a strategy for monitoring large rivers in collaboration with EPA local office
- ☐ To complete the Fixed Station Monitoring Project with assistance of student interns and USGS
- ☐ To develop a process to determine wetland gain and losses in collaboration with other DEQ programs

Monitoring Objectives and Design

Each monitoring project is designed to ensure that project objectives are met, thus satisfying the monitoring goals listed previously. The majority of the monitoring designs are targeted designs. The single exception is the Environmental Monitoring and Assessment Program (EMAP) program, which is based on a probabilistic design.

⁵⁹ Code of Federal Regulations, Title 40, Part 130.4, Water Quality Monitoring.

⁶⁰ Montana Department of Environmental Quality (US) [DEQ]. 2000 Final Montana 303(d) List. A compilation of Impaired and Threatened Waterbodies in Need of Water Quality Restoration. Table 3-E [online document]. Helena, MT: DEQ; 2000. Available from: <http://deq.mt.gov/CWAIC/default.aspx>.

Details regarding the specific monitoring objectives and designs for each monitoring project are discussed later in this section.

Coordination and Collaboration

As noted in the 2002 - 2006 strategy, the need to coordinate and collaborate with other entities to continue non-reassessment projects was critical. Coordinating and collaborating with other agencies and stakeholders is implicit in CWA programs. Through this collaboration and coordination, the WQPB developed partnerships and cooperative agreements. Among the entities that have cooperative agreements are: the Bureau of Land Management, the U.S. Forest Service, the University of Montana, and its Flathead Biological Station facility, Conservation Districts, and Local Watershed Groups such as the Tri-State Water Council. Brief discussions of each of each partner's roles are provided below.

Bureau of Land Management (BLM)

The objective of the BLM's water quality monitoring program is to determine if water quality standards are met for waters that flow through BLM administered land. To achieve this goal, the WQMS and BLM established a Memorandum of Understanding (MOU). For the last six years, ten reference sites (3 times per year) have been sampled within BLM land to assess their condition. BLM provides a portion of the funds for this monitoring effort.

Forest Service (USFS)

The USFS monitors waters within National Forest lands. The WQPB uses data provided by USFS in its water quality assessment process, for the development of watershed restoration plans, and for total maximum daily loads (TMDLs) for waters listed in categories 4C and 5 of this integrated water quality report.

Tri-State Water Council

The non-profit Tri-State Water Quality Council is a partnership of diverse community interests including citizens, business, industry, tribes, government, and environmental groups working together to improve and protect water quality throughout the 26,000 square mile Clark Fork-Pend Oreille watershed. The watershed includes the Clark Fork River in western Montana, Pend Oreille Lake in northern Idaho, and the Pend Oreille River in eastern Washington. The Tri-state's long term monitoring program tracks the effectiveness of the Clark Fork-Pend Oreille Basin water quality management plan in addressing interstate nutrient and eutrophication problems. DEQ as part of the council provides financial support for components of the sampling effort.

United States Geological Survey (USGS)

Data collected by USGS is made publicly available through a USGS website in its water quality assessments. The WQPB provides financial support for several surface water sampling projects conducted by the USGS. The majority of these efforts are located in the Powder-Tongue River Basin, Bitterroot Basin, and Blackfoot River. The USGS also collected and analyzed a portion of the physical and chemical data in support of the five year fixed station monitoring project. At the end of the five year effort, the USGS produced a final report summarizing the findings.⁶¹

Montana and Canada have an agreement to sample the Poplar River and East Fork of the Poplar River in northeast Montana. As part of this international committee, the USGS and DEQ have worked together to sample the extents of these rivers that are within the jurisdiction of the United States.

University of Montana (UM)

The WQPB contracts with the Watershed Health Clinic of the Environmental Studies Program at the University of Montana (UM) to continue the State's reference and lake projects. Under these contracts, UM provides graduate students to perform field sampling and laboratory analysis. The WQPB provides financial support, training, and most of the necessary field supplies to conduct the monitoring. Additionally, the WQPB contracts with the Flathead Lake Biological Station facility of UM to sample one station in Flathead Lake 15 times per year.

⁶¹ Lambing, J H and T. E Cleasby. 2006. Water-Quality Characteristics of Montana streams in a Statewide Monitoring Network, 1999-2003, USGS.

Conservation Districts (CDs), Watershed Groups and Non-Profit Organizations

Partnerships with CDs, local watershed groups, and non-profit organizations with an interest in water quality issues vary from simply informing them when sampling occurs in their area, to obtaining assistance with land access, to full participation on the sampling events. These partnerships and community involvement continue through TMDL development and on to restoration and TMDL implementation programs funded by CWA section 319 grants administered by the WQPB.

Laboratory Analytical Support

The WQPB contracted with numerous analytical and biological laboratories for chemical and biological analyses used in its monitoring projects. The following list details the major laboratory facilities used, their institutional status, the type of analyses performed, and the projects these data supported:

Name	Institution	Type of Analysis	Projects
USGS Water Lab, Denver, CO and Madison, WI	Federal Government	General Chemistry, Heavy Metals, Nutrients	Reassessment, Lakes, Fixed
EPA Region 8 Lab, Denver, CO	Federal Government	Pesticides	Reassessment
DPHHS Environmental Lab, Helena, MT	State Government	General Chemistry, Heavy Metals, Nutrients, Chlorophyll-a	Reassessment, Fixed, Reference, Lakes
University of Montana, Watershed Health Clinic	State University	Chlorophyll-a	Reference, Lakes
University of Montana, Flathead Lake Biological Station	State University	Nutrients	Reference, Lakes
Energy Laboratories, Helena, MT	Private	General Chemistry, Nutrients, Chlorophyll-a	Reassessment, Large Rivers
Energy Laboratories, Billings, MT	Private	Heavy Metals	Reassessment, Large Rivers
ACZ Laboratories, Steamboat Springs, CO	Private	Heavy Metals	Reassessment (QA Lab)
Rhithron Associates, Missoula, MT	Private	Macroinvertebrate Taxonomy and Ecology	Reassessment, Fixed, Reference, Biological Monitoring
National Academy of Sciences, Philadelphia, PA	University	Periphyton Diatom Taxonomy and Ecology	Reassessment
<i>Hannaea</i> , Helena, MT	Private	Periphyton Diatom Taxonomy and Ecology	Reference

Networks and Projects

The WQPB Monitoring Program consists of eight monitoring projects:

1. Reassessment Monitoring,
2. Reference Site Monitoring,
3. Environmental Monitoring and Assessment Program (EMAP) w/ EPA,
4. Lakes and Reservoirs Monitoring,
5. Large Rivers Monitoring,
6. Fixed Station,
7. Biological Monitoring, and
8. Wetlands.

Each of these projects is briefly described below.

Reassessment Monitoring Project**Objective**

The objective of the reassessment monitoring project was to obtain sufficient credible data to make beneficial use support determinations for those waters placed in the 2000 303(d) Reassessment List.⁶²

Design

This project uses a targeted design. The smallest units for which individual beneficial use support determinations are made are based on the waterbody segments defined in the Assessment Database (ADB).

Spatially, waterbody segments are subdivided into homogeneous reaches with reach breaks inserted where changes in geomorphology, land-use, or where significant peripheral influences such as major tributaries, known point sources, abandoned mines, roads, bridges, dams or other structures could influence beneficial use support. The maximum reach length is limited to 20 miles. Each reach is represented by a minimum of two sampling sites, except where a waterbody is <5.5 miles in length and is a single homogeneous reach. These short segments may be represented by a single sampling site. Sites inaccessible due to remote locations and private property are recognized as a constraint to spatial distribution and may result in a fewer number of sampling sites.

Temporally, the sampling design was constrained by the schedule for completion, number of waterbody segments, as well as funding and available staff resources. Thus, the majority of the waterbodies were sampled only once by DEQ during the 2006 reassessment period. However, the DEQ used multiple lines of additional data from various entities. The monitoring design relies upon the ability of the core indicators to expand the window of temporal coverage. For example, impacts to a waterbody's habitat may be observed for years or even decades and can be assessed from data collected in habitat surveys. Biological communities may take months to recover from an acute event and are expected to reflect chronic conditions that may not be picked up with point-in-time measurements such as chemistry samples. A complete description of the sampling process design used for the reassessment project can be found in the reassessment project Quality Assurance Project Plan (QAPP).⁶³

Project Description

⁶² Montana Department of Environmental Quality (US) [DEQ]. 2000 Final Montana 303(d) List. A compilation of Impaired and Threatened Waterbodies in Need of Water Quality Restoration. Table 3-E [online document]. Helena, MT: DEQ; 2000. Available from: <http://deq.mt.gov/CWAIC/default.aspx>.

⁶³ Montana Department of Environmental Quality (US) [DEQ]. 2005. Quality Assurance Project Plan. Sampling and Water Quality Assessment of Streams and Rivers in Montana, 2005. WQPBQAP-02. Rev. 03. [online document] Helena, MT: DEQ; 2005. Available from: <http://www.deq.mt.gov/wqinfo/QAProgram/WQPBQAP-02.pdf>.

The protocol to establish if there is sufficient credible data to make a beneficial use support determination was developed in 2000. Pursuant to Montana Law, DEQ implemented the Sufficient and Credible Data Process.⁶⁴ This process requires sufficient credible data before making a beneficial use support determination. Physical, habitat, chemical, and biological sampling is conducted at each site. A description of the field procedures can be found in the 2005 Field Procedures Manual.⁶⁵

DEQ's primary focus was to assess all of the waters listed on the 2000 303(d) Reassessment list.⁶⁶ These waters were removed from the 1998 303(d) list of impaired waters due to a lack of sufficient credible data. In 2000, the reassessment list consisted of 486 waters. Because of segment splits, 493 waters were subsequently listed on the Appendix B of the 2004 Water Quality Integrated Report⁶⁷, whereas in 2006, further segment splits and merges resulted on 497 waters (Appendix A, Figure 3, Figure 4, Figure 5, and Figure 6). However, 23 of those waters were not assessed due to the following circumstances: access denied (2), dry (3), included in the Tongue-Powder-Rosebud TMDLs (12), clerical errors resulting in erroneous 1996 listings (2), or were simply missed by the reassessment effort (4). Thus, of the 497 waters on the 2000 303(d) Reassessment list, 474 waters were evaluated via the Reassessment Monitoring Project.

⁶⁴ Montana Department of Environmental Quality (US) [DEQ]. 2004. Standard Operating Procedures Water Quality Assessment Process and Methods (formerly Appendix A to 303(d) 2000-2004) WQPBWQM-001. Rev#:01 [online document]. Helena, MT: DEQ; 2004. Available from: <http://www.deq.mt.gov/wqinfo/QAProgram/SOP%20WQPBWQM-001.pdf>.

⁶⁵ Montana Department of Environmental Quality (US) [DEQ]. 2005. Field procedures Manual. [online document]. Helena, MT: DEQ, WQPB; 2005. Available from: <http://www.deq.state.mt.us/wqinfo/QAProgram/index.asp>.

⁶⁶ Montana Department of Environmental Quality (US) [DEQ]. 2000 Final Montana 303(d) List. A compilation of Impaired and Threatened Waterbodies in Need of Water Quality Restoration. Table 3-E [online document]. Helena, MT: DEQ; 2000. Available from: <http://deq.mt.gov/CWAIC/default.aspx>.

⁶⁷ Montana Department of Environmental Quality (US) [DEQ]. 2004 Water Quality Integrated Report for MT 2004. Appendix B [online document]. Helena, MT: DEQ; 2004. Available from: <http://deq.mt.gov/CWAIC/default.aspx>.

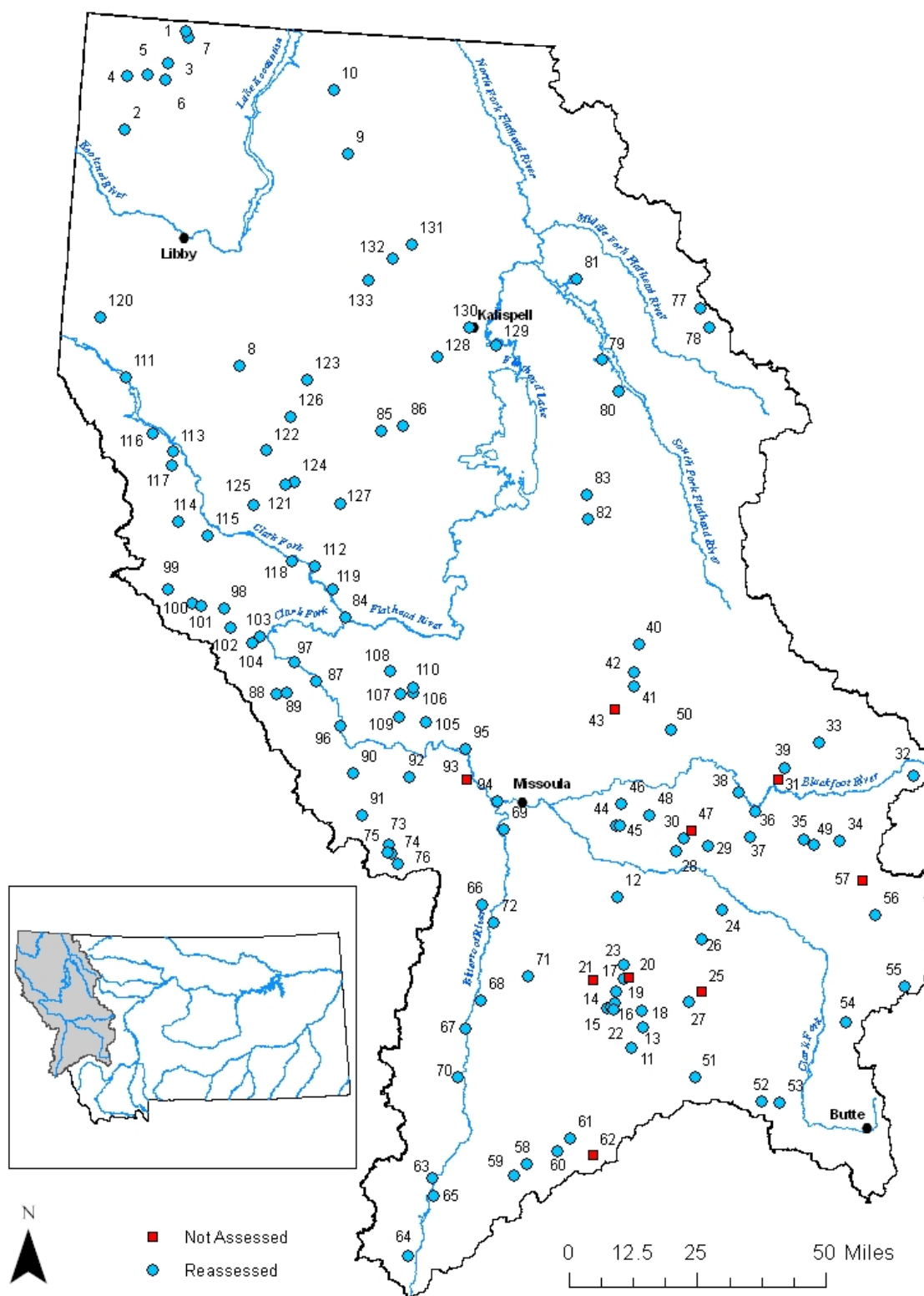


Figure 3. Columbia Basin-Reassessment Waters

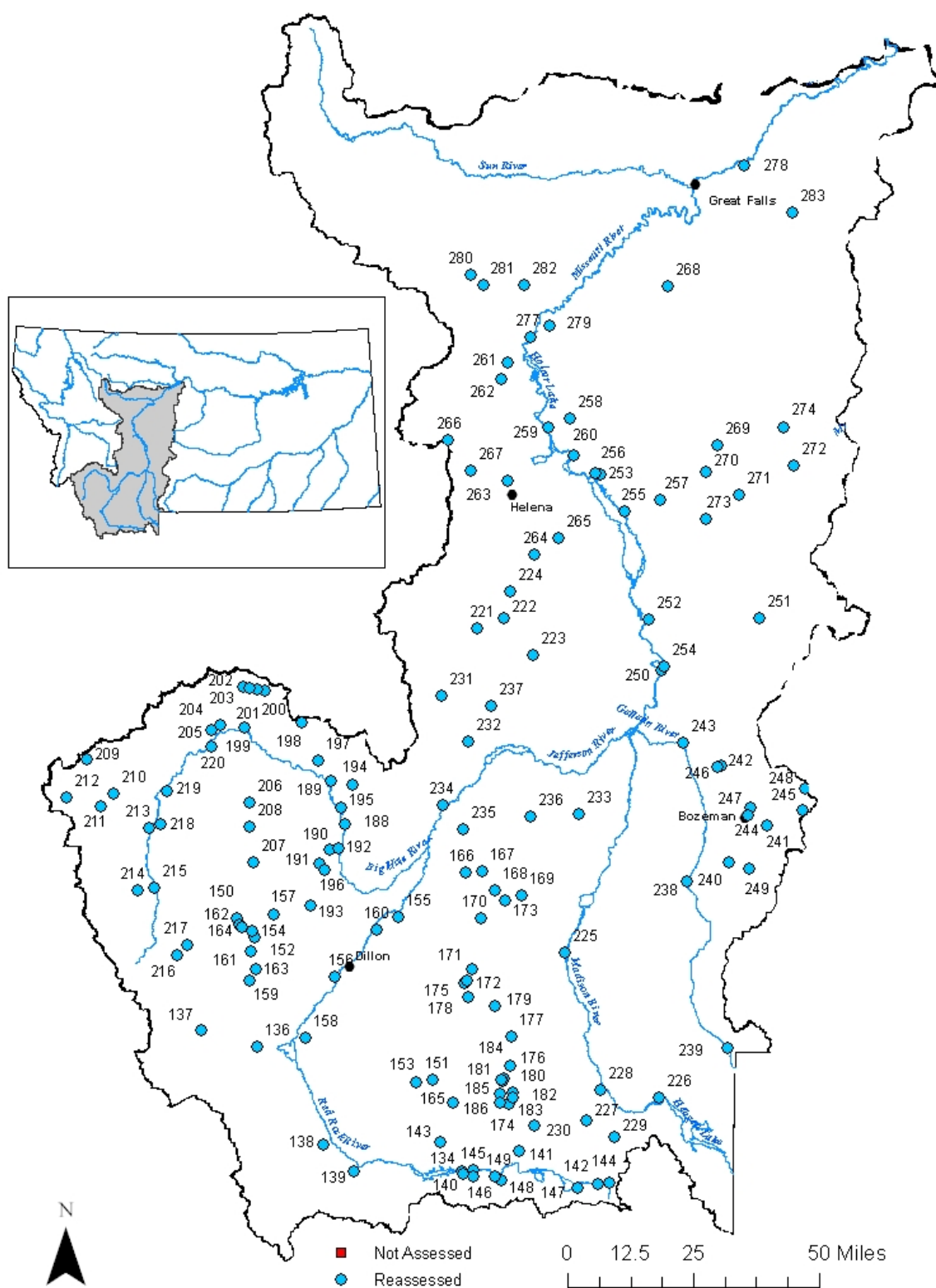


Figure 4. Upper Missouri Basin-Reassessment Waters

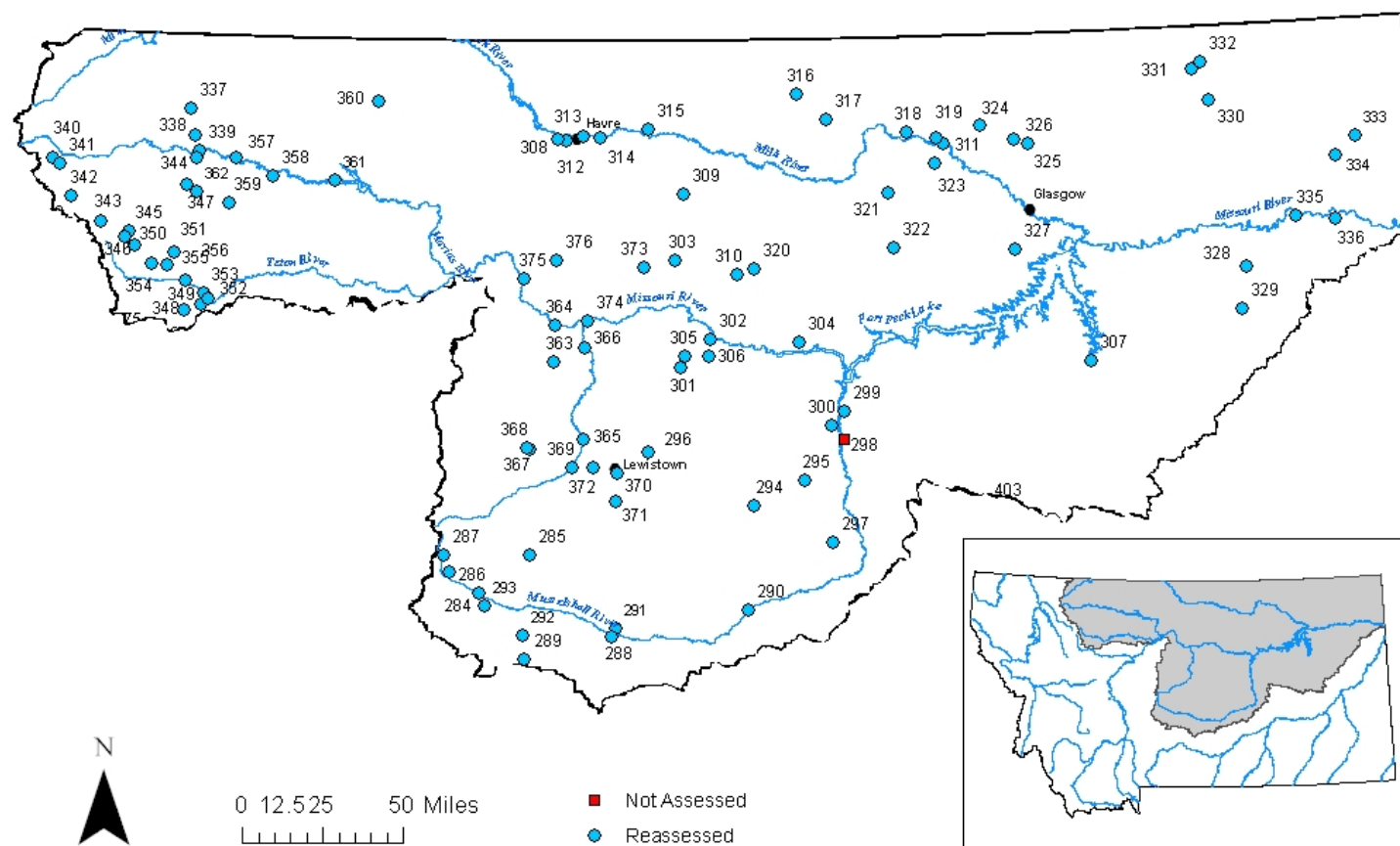


Figure 5. Lower Missouri Basin-Reassessment Waters

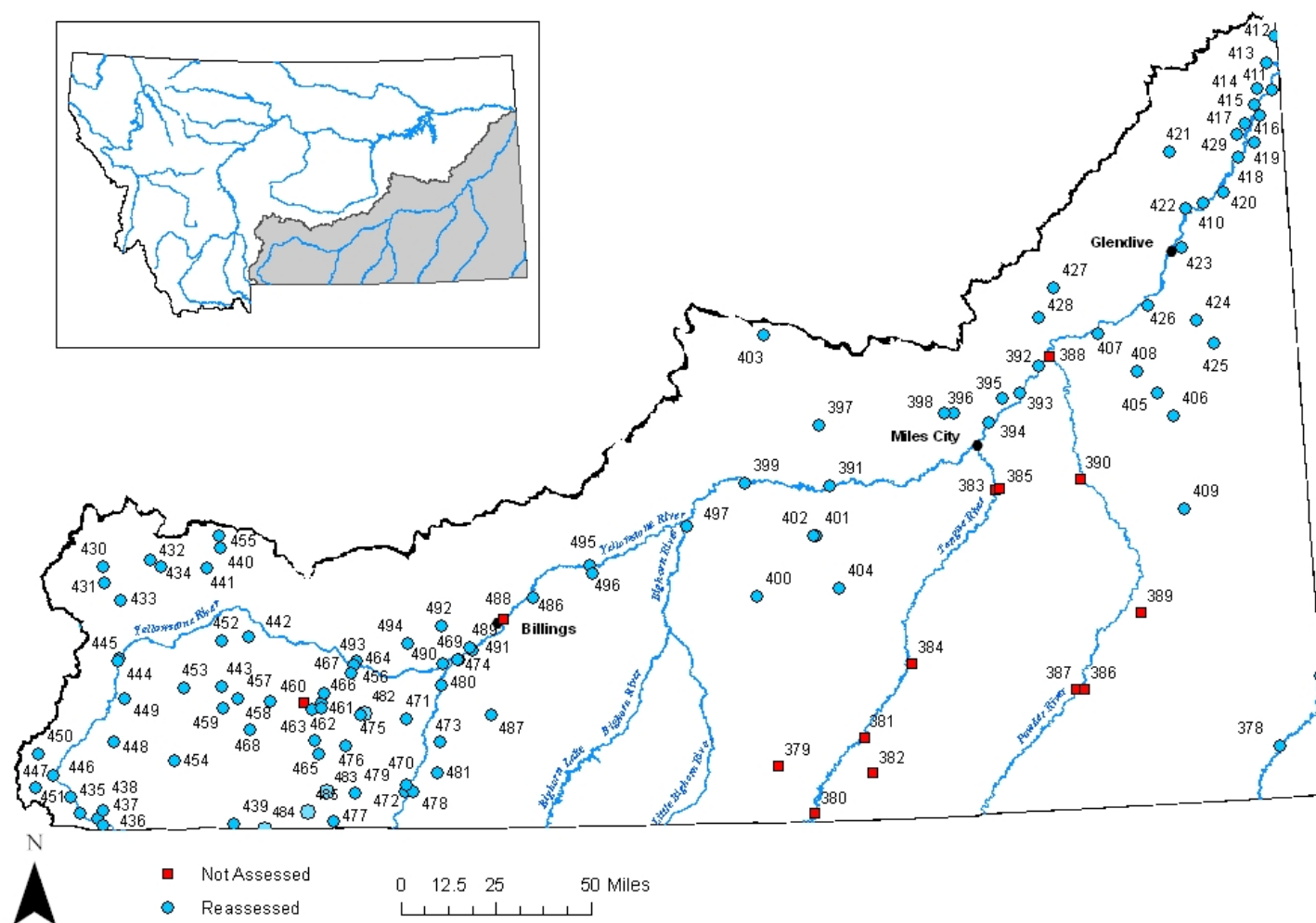


Figure 6. Yellowstone Basin-Reassessment Waters

The new ADB, implemented for the 2006 cycle has different cause names available in comparison with the 1996 list. Table 9 maps the 1996 and 2006 causes for the development of Appendix C. This appendix reflects the impairment causes de-listed from the 2000 303(d) Reassessment List. Dewatering, other Inorganics, taste and odor, and unknown toxicity causes in 1996 could not be mapped in the 2006 list.

Table 9. 1996 versus 2006 Cause Listings

1996 Causes	2006 Causes
NA ¹	Benthic-Macroinvertebrate Bioassessments (Streams) BOD, Biochemical oxygen demand Combined Biota/Habitat Bioassessments (Streams) Dissolved Gas Supersaturation Habitat Assessment (Streams) Impairment Unknown Nonnative Fish, Shellfish, or Zooplankton Other Oxygen, Dissolved Sulfates
Flow Alteration	Fish-Passage Barrier High Flow Regime Low flow alterations Other flow regime alterations
Metals	Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium (total) Cobalt Copper Cyanide Iron Lead Manganese Mercury Mercury in Water Column Nickel Selenium Silver Thallium Uranium Zinc
Non-priority organics	Pentachlorobenzene
Noxious aquatic plants	Aquatic Plants - Native Chlorophyll-a Excess Algal Growth
Nutrients ²	Ammonia (Total) Ammonia (Un-ionized) Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrates Nitrogen (Total)

1996 Causes	2006 Causes
	Nitrogen, Nitrate
	Nutrient/Eutrophication Biological Indicators
	Organic Enrichment (Sewage) Biological Indicators
	Phosphate
	Phosphorus (Total)
	Phosphorus, Elemental
	Total Kjeldahl Nitrogen (TKN)
Oil & Grease	Oil and Grease
Other habitat alterations	Alteration in stream-side or littoral vegetative covers
	Alterations in wetland habitats
	Other anthropogenic substrate alterations
	Physical substrate habitat alterations
Pathogens	<i>Escherichia coli</i>
	Fecal Coliform
pH	pH
Priority organics	DDE
	DDT
	Endosulfan
	Endrin aldehyde
	PCB in Water Column
	Polychlorinated biphenyls
Salinity/TDS/Chlorides	Chloride
	Salinity
	Specific Conductance
	Total Dissolved Solids
Siltation ³	Bottom Deposits ⁴
	Sedimentation/Siltation ⁴
Suspended Solids ³	Solids (Suspended/Bedload) ⁴
	Total Suspended Solids (TSS)
Thermal Modifications	Temperature, water
Turbidity ³	Turbidity ⁴

¹The 2006 causes of impairment that could not be directly linked with any 1996 causes of impairment, and therefore were not used in developing Appendix C.

²The following 1996 causes of impairments were grouped into a nutrients category for the development of Appendix C: Nutrients, Organic enrichment/DO, Organic enrichment/Low DO, and Unionized Ammonia.

³ The following 1996 causes of impairments were grouped into a sedimentation/siltation category for Appendix C: Siltation, Suspended Solids, and Turbidity.

⁴ The following 2006 causes of impairments were grouped into a sedimentation/siltation category for Appendix C: Siltation, Suspended Solids, and Turbidity.

Reference Site Monitoring Project

Objectives

- ☐ To establish a network of reference sites
- ☐ To define reference conditions for use in assessments
- ☐ To help in the establishment of TMDL endpoints
- ☐ To aid in the development of water quality standards

Design

This project uses a targeted design for areas lacking reference sites and areas within BLM lands.

Project Description

In 1990, Bahls et al.⁶⁸ conducted a study of 38 reference sites throughout Montana. These sites were selected using Best Professional Judgment (BPJ). Biological, chemical, and habitat sampling was conducted at each site. Beginning in 2000 and continuing through 2001, WQPB revisited the wadeable sites from Bahls' study and identified additional sites using BPJ. Sites were sampled using EMAP protocols⁶⁹, and visited twice a year to examine seasonal variability. No reference sites were sampled in 2002, but 17 sites were sampled in 2003. Sites in 2003 were sampled multiple times during the summer for biological, chemical and habitat parameters. In 2004 and 2005, a total of 30 reference sites (both existing ones and candidates) were sampled three times per summer in southwestern, southeastern, and northeastern MT (Figure 7). Protocols used in the reference project are described in the Quality Assurance Plan Reference Addendum⁷⁰.

In 2005, a screening process was developed that uses both watershed and site-specific data to assess overall quality of the reference sites. In this screening process, a balance is made between the relative importance of site-specific impacts (e.g., heavily grazed riparian area) and watershed-level impacts (e.g., extensive timber harvest upstream of the site). Sites that pass through the screening process are considered final reference sites. The process and the reference site descriptions are described in detail in Suplee et al. (2005)⁷¹.

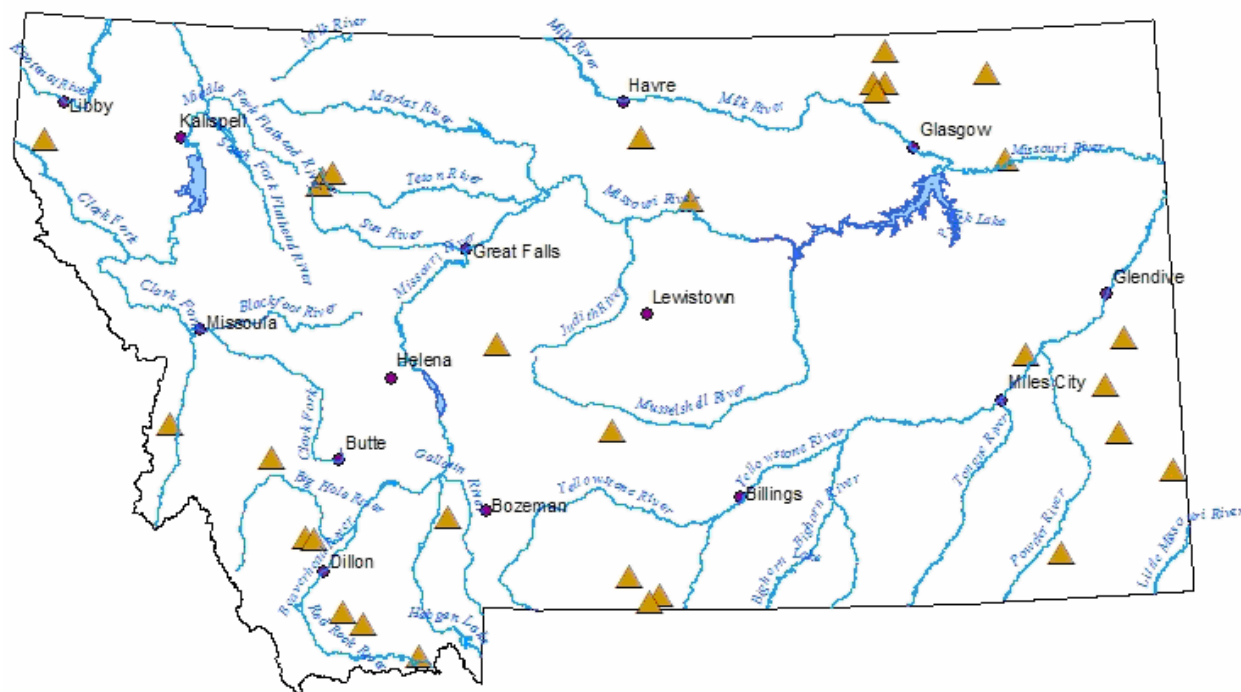


Figure 7. Reference Sites sampled in 2004-2005

⁶⁸ Bahls, L.I., Bukantis, B., and S. Trelles. 1992. Benchmark biology of Montana Reference Streams. Montana Department of Health and Environmental Science, Helena.

⁶⁹ Peck, D.V., Lazorchak, J.L., Klemm, D.J. 2003. Environmental and Assessment Program Surface Waters. Western Pilot Study-Field Operations Manual for Non-Wadeable Streams. U.S. Environmental protection Agency.

⁷⁰ Montana Department of Environmental Quality (US) [DEQ]. Reference Addendum on the Quality Assurance Project Plan: sampling and Water Quality Assessment of Streams and Rivers in MT 2005 [online document]. Helena, MT; [DEQ]; 2005. Available from:

http://www.deq.mt.gov/wqinfo/QAProgram/Reference%20Project%2005_SAP.pdf

⁷¹ Suplee, M., Sada de Suplee, D., Feldman, D., and Laidlaw, T. 2005. Identification and Assessment of Montana Reference Streams: a Follow-Up and Expansion of the 1992 Benchmark Biology Study. Montana Department of Environmental Quality. Helena, MT.

Lakes/Reservoirs Monitoring**Objectives**

- ☐ To refine water quality standards for lakes, including the development of a lake and reservoir classification system
- ☐ To assess beneficial use attainment of lakes
- ☐ To provide data for analysis of trends and monitor effectiveness of any TMDL efforts

Project Description

The main objective of this project is to collect baseline nutrient and chlorophyll *a* data to identify lake characteristics that can be used to predict appropriate trophic status for lakes on a regional scale. The data-collection effort has been constant since 2003. The WQPB works cooperatively with UM to conduct the field sampling. The UM hires a field crew comprised of 2-3 graduate students and the WQPB supplies the boat and field gear. In 2005, the WQPB directly hired the field crew leader. The sampling effort focused on collecting data from “reference” lakes (approximately 15 annually) in 2003 and 2005. However, in 2004, the lakes and reservoirs selected for sampling came mainly from the Reassessment list⁷². Standard lake sampling is as follows: One mid-lake site is sampled, with the exception of larger reservoirs where two sites are sampled. Three sampling events occur between June and September. The lakes are sampled using depth-integrating techniques (epilimnion only) for nutrients, common water quality parameters, and phytoplankton Chlorophyll *a*. A surface-to-bottom profile of dissolved oxygen, temperature, conductivity, and pH is also made during each visit using a YSI 6600 sonde, and the lake shoreline is assessed using EMAP methods. Further details on the protocols can be found in the Quality Assurance Plan Lakes Addendum⁷³. These data are used to make beneficial use support determinations based on DEQ’s SOP⁷⁴, and as a baseline for future lake classification.

Environmental Monitoring Assessment Program (EMAP) Project**Objective**

To assess perennial streams and rivers statewide for aquatic life use, and to evaluate applications of the probabilistic design.

Design

This project uses a probabilistic random design.

Project Description

Sites were selected randomly across the State according to protocols developed by EMAP Western Pilot Project. During 2000-2004, 120 sites were visited and in 91 of those sites (Figure 6), biological, chemical, and physical habitat parameters were collected on wadeable streams according to EMAP protocols for wadeable streams⁷⁵. EPA contractors completed the sampling on the 15 non-wadeable sites according to EMAP protocols for non-wadeable

⁷² Montana Department of Environmental Quality (US) [DEQ]. 2000 Final Montana 303(d) List. A compilation of Impaired and Threatened Waterbodies in Need of Water Quality Restoration. Table 3-E [online document]. Helena, MT: DEQ; 2000. Available from: <http://deq.mt.gov/CWAIC/default.aspx>.

⁷³ Montana Department of Environmental Quality (US) [DEQ]. Lakes Addendum on the Quality Assurance Project Plan: sampling and Water Quality Assessment of Streams and Rivers in MT 2005. [online document]. Helena, MT: DEQ; 2005. Available from: <http://www.deq.mt.gov/wqinfo/QAProgram/2005LakesSAP.pdf>.

⁷⁴ Montana Department of Environmental Quality (US) [DEQ]. 2004. Standard Operating Procedures Water Quality Assessment Process and Methods (formerly Appendix A to 303(d) 2000-2004) WQPBWQM-001. Rev#:01 [online document]. Helena, MT: DEQ; 2004. Available from: <http://www.deq.mt.gov/wqinfo/QAProgram/SOP%20WQPBWQM-001.pdf>.

⁷⁵ Peck, D.V., Lazorchak, J.L., Klemm, D.J. 2003. Environmental and Assessment Program Surface Waters. Western Pilot Study-Field Operations Manual for Wadeable Streams. U.S. Environmental Protection Agency.

streams⁷⁶. Currently, biological data are still being processed. The WQPB is in the process of analyzing the available chemical and habitat data.

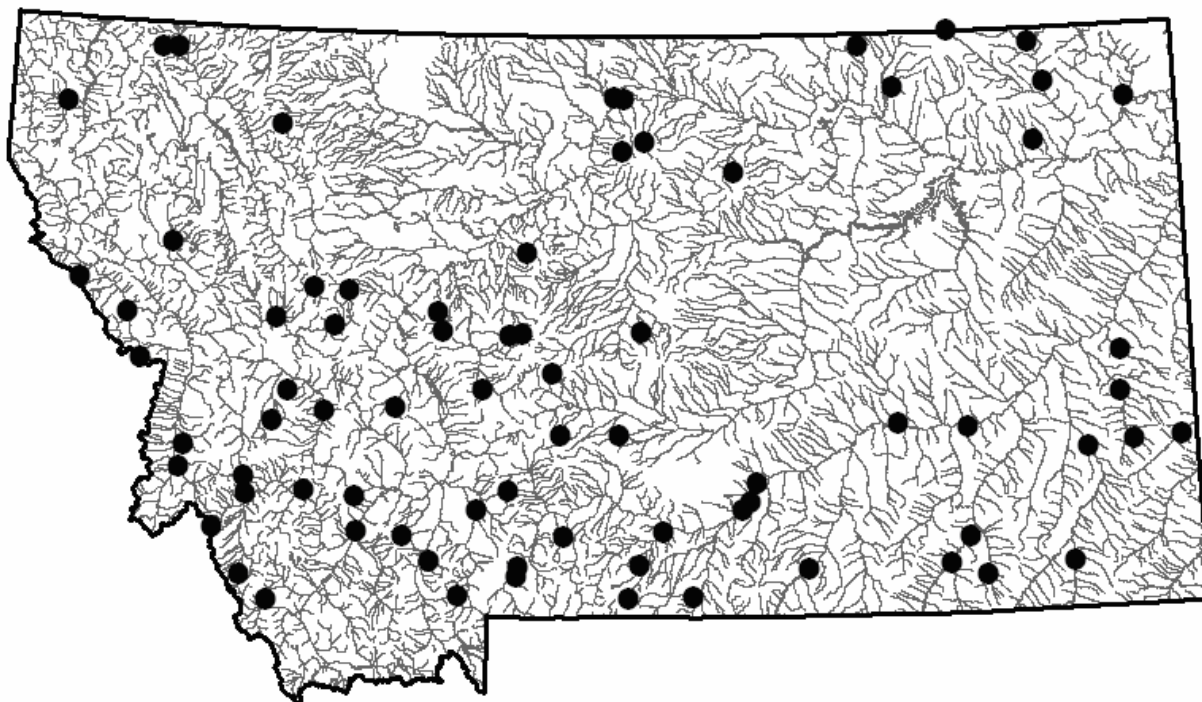


Figure 8. EMAP Sites 2000-2004

Large Rivers Monitoring

Objective

The objective of the Large Rivers Monitoring Project is to examine current protocols for the assessment of large rivers and to evaluate the approaches used nationwide.

Design

This will be determined after evaluation of current protocols and approaches.

Project Description

Nutrients, sediment, and temperature are among the most common pollutants causing water quality impairment in Montana's streams and rivers. At this point, Montana's water quality standards for these three pollutants are narrative. To interpret and apply the narrative standards, one must understand the "natural" or "reference" condition. Reference data for the large rivers in Montana (i.e., larger than 6th Order) is limited, and the natural condition relative to many of the indicators typically applied to interpret these narrative standards is poorly understood. This is further complicated by the fact that most of Montana's large rivers are dammed and Montana Code Annotated 75-5-306 states that "*conditions resulting from the reasonable operation of dams at July 1, 1971 are "natural."*" To define "natural" under 75-5-306, the reasonableness of dam operation must be evaluated.

For these reasons, Montana began reexamining their protocols for the assessment of large rivers in late 2004. EPA's Montana field office and DEQ, with contractor support, are evaluating the approaches being used nationally to interpret large river data such as literature values, reference reach approach, exposure-response, and modeled

⁷⁶ Peck, D.V., Averill, DK., Lazorchak, J L., Klemm, DJ. 2003. Environmental and Assessment Program Surface Waters. Western Pilot Study-Field Operations Manual for Non-Wadeable Streams. U.S. Environmental Protection Agency.

expectations relative to nutrients, sediment, temperature, and aquatic life. A consistent definition for large rivers (e.g., Strahler order, watershed size, etc) and a recommended approach will be developed. A small-scale pilot study will then be implemented for validation and testing purposes for statewide application.

In the interim, the approach for large rivers that has been applied for the 2006 Integrated 303(d)/305(b) Water Quality Report is to conservatively assume that the 1996 listed impairments, and causes/sources of impairment, persist at present. The exceptions to this approach would be for cases where new data definitively suggest good cause. In these cases, causes of impairment may be de-listed or added. Montana's large river segments will be reassessed following completion of the large river protocols.

Fixed Station Project

Objectives

- ☐ Document stream and river baseline water-quality conditions
- ☐ Track the status of annual variations in water quality and biological conditions
- ☐ Establish a reference dataset that could be used to eventually detect long-term water quality trends
- ☐ Assess attainment of water quality standards
- ☐ Identify locations in need of additional attention
- ☐ Provide background data for planning and evaluating stream classification, standards, and assessment methods.

Design

The fixed station project is a network designed to provide a systematic measure of water quality and biological condition that would allow for characterization of current conditions across the State, as well as provide a reference to assess change overtime. Sites were selected to represent the upper and lower mainstem segments of the three major river basins in Montana—Missouri, Yellowstone, and Columbia—and major tributaries to these rivers (Figure 9). Sites were monitored by USGS at locations that had active USGS streamflow gaging stations that provided quantitative streamflow information to enhance the ability to understand how water quality varies in response to changing flow. These fixed-station sites are considered to be integrator sites, which were chosen to reflect the cumulative condition of the entire watershed. DEQ added several supplementary sites to the SWM network in 2002 and 2003 that were either at ungaged locations or were upstream from an integrator site to help determine how water quality and biological conditions changed from upstream to downstream locations. Biological sampling occurred at most of the sites within the SWM network.

Project Description

A total of 53 fixed-station sites were monitored by the SWM network (Table 10). The USGS was partially funded by DEQ to monitor water quality and flow at 38 integrator sites at least three times per year during spring runoff and once during the summer when the stream was at or near baseflow conditions. The USGS analyzed the water quality samples for common ions, nutrients, and trace metals. They also collected continuous water temperature data at 26 sites from April through September. Most of the integrator sites and fifteen additional sites were also monitored by DEQ to assess biological conditions and to collect additional water quality data.



Figure 9. Fixed Station Monitoring Sites

Table 10. Data Collected by the Fixed Station Network

Basins	Site#	STORET / USGS Station ID	Waterbody	Parameters
Missouri River Basin	1	M02BVHDR01	Beaverhead River near Dillon	B, C, M, P, WQ2
	2	M08BEAVR01	Beaverhead River at Twin Bridges	B, C, M, P, T, WQ2
	3	M03BGHLR01	Big Hole River near Wise River	B, C, M, P, WQ2
	4	M03BGHLR02	Big Hole River near Twin Bridges	B, C, M, P, WQ2
	5	M08JEFFR01	Jefferson River near Three Forks	B, C, M, P, S, T, WQ1, WQ2
	6	M06MADNR01	Madison River near Three Forks	B, C, M, P, WQ2
	7	M05GALLR01	Gallatin River at Logan	C, M, P, S, T, WQ1 X
	8	M05GALLR02	Gallatin River near Three Forks	B, C, M, P, WQ2
	9	M09MISSR01	Missouri River near Toston	T, WQ1, X
	10	M09PRPEC01	Prickly Pear Creek near Clancy	B, C, M, P, S, WQ1, WQ2
	11	M12DRBNR01	Dearborn River at Craig	B, C, M, P, S, T, WQ1, WQ2
	12	M10SMTHR01	Smith River at Eden Bridge	B, C, M, P, WQ2
	13a	M13SUNR01	Sun River at Sun River	B, C, M, P, WQ2
	13b	USGS06089000	Sun River near Vaughn	T, WQ1
		M14TETOR01	Teton River near Loma	C, M, P, S, X
	14	M14TETOR02	Teton River near Loma - 1/4 mi upstream from rec site	B, C, M, P, S, T, WQ1, WQ2
	15	M22JUDR01	Judith River 2 mi u/s confluence w/ Missouri R	B, C, M, P, T, WQ1, WQ2
	16	M24MUSSR01	Musselshell River at Harlowton	B, C, M, P, WQ2
	17	M28MUSSR01	Musselshell River near Mosby	B, C, M, P, S, T, WQ1, WQ2
	18	M37PEOPC01	Peoples Creek near Dodson	C, M, P, WQ1, X
	19	M45MILKR02	Milk River at Bjornberg Bridge	C, M, P
	20	M45MILKR01	Milk River at Nashua	B, C, M, P, S, T, WQ1, WQ2
	21a	M47POPR01	Poplar River near Scoby	B, C, M, P, S, WQ2
	21b	USGS06181000	Poplar River at Poplar	T, WQ1
Yellowstone River Basin	22	M50BMDYC01	Big Muddy Creek near Culbertson	C, M, P, X
	23	M51MISSR01	Missouri River near Culbertson	P, T, WQ1, X
	24	Y03YELLR01	Yellowstone River near Livingston	C, M, P, T, WQ1, X
	25	Y03SHIER01	Shields River near Livingston	B, C, M, P, S, T, WQ1, WQ2
	26	Y03BOULR01	Boulder River at Big Timber	B, C, M, P, S, T, WQ1, WQ2
	27	Y04STILR01	Stillwater River near Absarokee	B, C, M, P, S, T, WQ1, WQ2
	28	Y05CLFYR01	Clarks Fork of Yellowstone at Edgar	B, C, M, P, S, T,

Basins	Site#	STORET / USGS Station ID	Waterbody	Parameters
				WQ1, WQ2
	29	Y11BGHNR01	Bighorn River near Hardin	B, C, M, P, WQ2
	30	Y17BIGH01	Bighorn River at Bighorn	B, C, M, P, S, T, WQ1, WQ2
	31	Y17ROSEC01	Rosebud Creek at Rosebud	B, C, M, P, S, WQ1, WQ2
	32	Y15TONGR01	Tongue River near Stateline	C, M, P, X
	33	Y16TONGR01	Tongue River near Brandenburg	B, C, M, P, WQ2
	34	Y17TONGR01	Tongue River at Miles City	B, C, M, P, S, T, WQ1, WQ2
	35	Y18POWDR01	Powder River near Moorhead	B, C, M, P, WQ2
	36	Y21POWDR01	Powder River near Locate	B, C, M, P, S, WQ1, WQ2
	37	Y23YELLR01	Yellowstone River at Sidney	C, M, P, WQ1, X
Columbia River Basin	38	K01KOOTR01	Kootenai River near Libby Dam	C, M, P, T, WQ1, X
	39	K02FISHR01	Fisher River near Libby	B, C, M, P, S, WQ1, WQ2
	40	K01YAAKR01	Yaak River near Troy	B, C, M, P, S, T, WQ1, WQ2
	41	C01LTBLR01	Little Blackfoot River at Garrison	B, C, M, P, S, T, WQ1, WQ2
	42	C02ROCKC01	Rock Creek near Clinton	B, C, M, P, S, WQ1, WQ2
	43	C02CKFKR02	Clark Fork River at Turah Fishing Access	B, C, M, P, S, WQ1, WQ2
	44	C03BLACR01	Blackfoot River near Bonner	B, C, M, P, S, T, WQ1, WQ2
	45	C05BITRR01	Bitterroot River near Darby	B, C, M, P, WQ2
	46	C05BITTR01	Bitterroot R near Missoula abv bridge on N Ave	B, C, M, P, S, T, WQ1, WQ2
	47	C04CKFKR01	Clark Fork River at St Regis	B, C, M, P, S, WQ1, WQ2
	48	C06NFKFR01	NF Flathead River near Columbia Falls	B, C, M, P, S, WQ1, WQ2
	49	C07MFKFR01	MF Flathead River near West Glacier	B, C, M, P, S, WQ1, WQ2
	50	C08FRSFK01	SF Flathead River near Spotted Bear	B, C, M, P, WQ2
	51	C09WHTFR01	Whitefish River near Kalispell	B, C, M, P, S, WQ1, WQ2
	52	C10SWANR01	Swan River near Bigfork	B, C, M, P, S, T, WQ1, WQ2
	53	C12FLATR01	Flathead River near Perma	C, M, P, T, WQ1, X

B = 2003-2005 Bacteria data collected by DEQ one time per year.

C = 2001-2005 Chlorophyll data collected by DEQ one time per year

P = 2001-2003 Periphyton data collected by USGS one time per year.

M = 2001-2005 Macroinvertebrate data collected by DEQ one time per year.

S = 2001 Sediment metals data collected one time per year.

T = 1999-2003 Continuous temperature data collected during the summer by USGS.

WQ1 = 1999-2003 Water quality data collected by USGS four times per year.

WQ2 = 2004-2005 Water quality data collected by DEQ one time per year
X = Biological monitoring abandoned

The data from SWM network locations were used in WQSA decisions. Data summaries and analytical results for the fixed station network can be found in “Water Quality and Biological Characteristics of Montana Streams in a Statewide Monitoring Network, 1999-2005 Comprehensive Report.”⁷⁷

Biological Monitoring

Objectives

- ☐ To develop metrics and assessment tools for interpreting biological data
- ☐ To assess beneficial use attainment
- ☐ To establish TMDL endpoints

Design

This project uses targeted sampling in areas where biological data are not available.

Project Description

DEQ uses biological assemblages to make beneficial use support determinations as part of the process. A detailed explanation of the process can be found in the field manual procedures and in the QAPP.

1. Macroinvertebrates: A review of DEQ’s current macroinvertebrate assessment tools was contracted in 2004. Based on this review, two new metrics were adopted as part of DEQ’s procedures. The metrics are a new Ecoregional Multimetric indexes (MMI’s)’s, and a predictive model (RIVPAC) as another option⁷⁸.

Also, two comparability studies were conducted in 2004 to evaluate any impacts of mesh size or sampling protocols on metrics performance. Approximately 30 sites were sampled for both studies with duplicates taken at least 10% of the sites. The results of the study indicated no difference between the two mesh sizes. Results have not been published yet.

2. Periphyton: A study to refine periphyton metrics is currently funded to evaluate metrics used by DEQ and their possible refinement. As a result of this effort, new metrics have been developed for the Middle Rockies Ecoregion⁷⁹. A Standard Operating Procedure to use these metrics will be available by late Fall 2006, whereas for the other ecoregions, it will be available in late 2007.

Wetlands Monitoring

Objectives

- ☐ Coordinate with state, tribal, and federal agencies, and nonprofit groups to develop wetland assessment procedures that have widespread application in Montana
- ☐ Develop a wetland assessment program that provides valuable information about wetland loss or gain and condition to land management agencies and land owners:
 - Determine the status and trends of wetland quantity and quality in Montana
 - Identify wetlands that are at risk and need restoration or protection

⁷⁷ Apfelbeck, R. 2006. Water Quality and Biological Characteristics of Montana Streams in a Statewide Monitoring Network, 1999-2005 Comprehensive-Draft August 2006. Montana Department of Environmental Quality, Water Quality Standards Section, Water Quality Planning Bureau. Helena, MT.

⁷⁸ Montana Department of Environmental Quality. Macroinvertebrates SOP. 2006. Draft.

⁷⁹ Teply, M and L. Bahls. 2006. Diatom Biocriteria for MT Streams Middle Rockies Ecoregion SOP. DRAFT

- Identify the stressors that threaten our wetlands resources
- Map Montana's wetland resources

Project Description

Montana currently lacks a comprehensive wetland monitoring and assessment program. As a result, the State is unable to evaluate the status and trends of wetland quantity and quality, which would allow managers to assess our needs for, and implementation of, wetland restoration and protection. The U.S. EPA has identified the development of a comprehensive wetland monitoring and assessment program as a top priority to determine the causes, effects, and extent of pollution to wetland resources and to improve pollution prevention, reduction, and elimination strategies. For this reason, the U.S. EPA has provided funding to the DEQ for developing wetland assessment procedures and a wetland monitoring and assessment strategy. In addition, DEQ recognizes that the protection of Montana's wetlands is becoming increasingly complicated and that we would greatly benefit from a well-coordinated effort between researchers, state, tribal, and federal agencies, nonprofit groups, and landowners.

In order for Montana to develop a comprehensive wetland monitoring and assessment program we first need to develop the assessment protocols that we can use to accurately assess wetland conditions (i.e., ecological integrity). EPA has identified three assessment Levels for evaluating wetland ecological conditions. These include:

- ❑ **Level 1-** Landscape assessments rely almost entirely on Geographic Information Systems (GIS) and remote sensing data to obtain relatively coarse information about wetland and watershed conditions and the distribution and abundance of wetland types in a watershed.
- ❑ **Level 2-** Rapid field assessments that use relatively simple methods to collect at specific wetland sites. The method uses stressor indicators to help define the nature of site disturbance (e.g., browse indicators, trampling, invasive weeds, dead or dying cottonwood or willow, water diversions, noxious algae, siltation, adjacent land uses, etc.)
- ❑ **Level 3-** Intensive site assessments (ISA) provide higher resolution information on the condition of wetlands within an assessment area. Wetland bioassessments are a type of ISA that directly measures aquatic life beneficial uses. Hydrogeomorphic (HGM)-based assessment methods are another type of ISA. The detailed information from HGM assessments help refine landscape and rapid field assessments by providing reference condition characterization, helping diagnose the causes of wetland degradation, and developing design and performance standards for wetland restoration, including compensatory wetland mitigation.

The DEQ is developing Level 1, 2 and 3 wetland assessment procedures that compliment one another. For example, rapid field assessment methods (Level 2), which are developed using best professional judgment, can be tested and refined using results from more intensive wetland monitoring activity (Level 3), and results from both Level 2 and Level 3 assessments can be used to enhance the utility, or test the efficacy, of landscape scale (Level 1) assessments. For more information please visit the DEQ Wetland Conservation website at:

<http://www.deq.mt.gov/wqinfo/Wetlands/Index.asp>

Programmatic Evaluation

Updates of Monitoring Strategy and QA Plans

In October 2005, the WQPB submitted to EPA headquarters their draft Monitoring Strategy Plan. Comments were provided by EPA in January 2006. During fall 2006, comments will be addressed, and will be incorporated if necessary into the Monitoring Strategy Plan.

C.2 Assessment Methodology

Overview

At 40 CFR Part 130.4(b) the CWA requires that, "[t]he State's water monitoring program shall include collection and analysis of physical, chemical, and biological data, and quality assurance and control programs to assure

scientifically valid data.” At 40 CFR Part 130.7(b)(5) the CWA requires that, “[e]ach State shall assemble and evaluate all existing and readily available water quality-related data and information to develop the list.”

In following with the CWA, the Montana Water Quality Act [MCA 75-5-702(5)] requires, “...the department shall develop and maintain a data management system that can be used to assess the validity and reliability of the data used in the listing and priority ranking process.”

The following is a synopsis of DEQ’s assessment methodology that is used to satisfy both the CWA and Montana Water Quality Act. The entire method is available online as a WQPB Standard Operating Procedure⁸⁰ through the link referenced in footnote 2.

DEQ’s Water Quality Assessment is used to assess the validity and reliability of data, as well as the process for performing a beneficial use support determination. This two-step assessment process was adapted by DEQ from a model presented by EPA in a 1997 publication, “Guidelines for the Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement.”⁸¹ Using these guidelines as the basic framework for an assessment process, DEQ adapted it to address the sufficient credible data requirements in the Montana Water Quality Act [MCA 75-5-702] beginning with the year 2000 listing cycle.

Identification of Available Water Quality Data

For each reporting cycle, DEQ mails requests for information to several hundred individuals, organizations, and agencies that have an interest in water quality monitoring and management. As a result, DEQ receives numerous data and information from cooperative parties and catalogs the submitted material into its Water Quality Library. DEQ monitoring staff are informed of the existence of new data and information when reviewing newly catalogued entries for the waterbodies they are assessing.

In addition to data and information received in the call for all readily available data, DEQ uses data collected from its own monitoring efforts and data collected by other organizations that operate monitoring programs and store their data in publicly accessible databases. Data collected by (or for) DEQ ambient water quality programs is required to be housed in the EPA STORET (storage and retrieval) database. STORET is the single largest source of chemistry data for DEQ’s water quality assessments. In addition to STORET, databases operated by the United States Geological Survey’s (USGS - NWIS Web database) and the Montana Bureau of Mines and Geology’s (MBMG - GWIC database) contribute a significant data to water quality assessments.

The result of all these combined data sources is a collection of data and information of varying technical rigor, specificity to the DEQ waterbody segment, overall quality, and currency. The first step in the Water Quality Assessment method is to categorize this data into data types so that each type can be reviewed as an assemblage to determine whether sufficient credible data exists to proceed with the assessment.

Sufficient Credible Data

Montana law defines sufficient credible data (SCD) as "chemical, physical, or biological monitoring data, alone or in combination with narrative information, that supports a finding as to whether a waterbody is achieving compliance with applicable water quality standards" (MCA 75-5-103). A SCD evaluation is simply a data quality assessment procedure that considers the technical, representativeness, quality, and time components of data and information that is available. It establishes a measure of each assemblage’s rigor, which, in turn translates to a qualitative statement of confidence for the ensuing beneficial use assessment.

⁸⁰ Montana Department of Environmental Quality (US) [DEQ]. Water Quality Assessment Process and Methods - SOP WQPBQM-001 [online document]. Helena, MT: DEQ, WQPB; 2006. Available from: <http://www.DEQ.state.mt.us/wqinfo/QAProgram/SOP%20WQPBWQM-001.pdf>.

⁸¹ Environmental Protection Agency (US) [EPA]. 1997 USEPA Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement. Washington, DC: EPA; 1997. EPA-841-B-97-0025.

As noted in the overview of this section, DEQ used an EPA model for its SCD evaluation tools. However, the overall acceptance level (e.g., SCD Score) required to achieve SCD was a decision made by DEQ based on comments received from stakeholders during a public outreach and participation period (1999).

To assist with the determination of SCD Score, a table was constructed with text statements representing various levels of technical, spatial/temporal coverage, data quality, and data currency for each of the data assemblages (biology, chemical/physical, and habitat). These statements are grouped by numbers from 1 to 4 as follows:

- ☐ Statements representing poor data rigor are grouped with the number 1
- ☐ Statements representing fair data rigor are grouped with the number 2,
- ☐ Statements representing good data rigor are grouped with the number 3,
- ☐ Statements representing excellent data rigor are grouped with the number 4.

The assessor places a checkmark next to statements that are “true” regarding the assemblage being reviewed. When all relevant statements are checked, the assessor reviews the general consensus of where the checkmarks fall. Next the assessor reviews each data quality component (technical, spatial/temporal, quality, and currency, and determines the *most limiting factor of the assemblage*. If the general consensus of where the checkmarks are placed is negated by the most limiting factor, the score of the most limiting factor is selected. Otherwise, the general consensus is used as the score. This exercise is performed for each data assemblage. Assemblages scoring 1 are considered too limited to be used for water quality assessment decisions. The total of all assemblages scoring 2 or more are summed

The minimum score for proceeding with a beneficial use support determination for aquatic life and fisheries was set at 6. Other uses which rely upon one data type, such as drinking water, agriculture, and industry, are simply judged as either sufficient or insufficient depending on the rigor of associated chemistry data. The recreation use is also determined to be either sufficient or insufficient but is based on the existence and rigor of bacteriological, algae, and data pertaining to the aesthetic qualities of the waterbody. All measures of data rigor are documented in an assessment record, allowing users to understand the assessor’s basis (i.e., level of underlying information) supporting the use support decisions.

Beneficial Use Support

Once the State determines that sufficient credible data exists for a waterbody, the assessment process proceeds to an evaluation of beneficial use support. A beneficial use support determination assigns degrees of use support for each beneficial use based on the waterbody’s attainment or non-attainment of state water quality standards. These decisions are recorded in the waterbody’s assessment record and into the EPA’s water quality assessment program (Assessment Database – ADB version 2.2), which is used to manage assessment unit information, decisions, and produce the various tables in this report.

Levels of Use Support

There are six levels of use support used in beneficial use support determinations, these are:

1. Full Support – A beneficial use is fully supported if it is at its natural condition or best practical condition and water quality standards are attained.
2. Full Support (Threatened) – A beneficial use is considered threatened when it fully supports its uses, but observed trends, or proposed new sources of pollution not subject to permitting indicate a high probability of future impairment.
3. Partial Support – One or more data types indicate impairment. The State may list a beneficial use as partially supporting uses based on the nature and rigor of the data, as well as site-specific conditions.
4. Non-Support - One or more water quality standards for the beneficial use are not attained.

5. Insufficient Information – Data are insufficient in technical, spatial/temporal, quality, or currency rigor to represent conditions or are not comparable to state water quality standards, preventing the beneficial use to be assessed.
6. Not Assessed – A beneficial use support determination has not been initiated.

Aquatic Life and Fisheries – Making aquatic life and fisheries use support determinations can be a complex process because of the amount and variety of information that may be needed to make the decision. In some cases, the assessor will evaluate, compare, and weigh many bits of physical, biological, chemical, and habitat data in reaching the aquatic life and fisheries use support determinations for a waterbody. In other cases, only one or two of the aquatic life data categories (habitat/physical, biology, or chemistry) provide clear evidence of use support or impairment. For the aquatic life and fisheries uses there are three means to assess beneficial use support: Overwhelming Evidence, Independent Evidence, and Weight-of-Evidence.

Overwhelming evidence is clear evidence, often from a single data type, that the beneficial use is, or is not, being supported. Examples of overwhelming evidence for *non-support* determinations are documented fish kills, fish consumption closures (e.g., Silver creek), and swimming restrictions due to bacteria. Although rarely used, an example of overwhelming evidence of *full support* can be made. Examples of these would include a waterbody being in wilderness area. Because these overwhelming evidence determinations represent extreme and obvious conditions, the overwhelming evidence approach overrides the need to achieve a set SCD score. This allows extreme conditions to be identified for the public and control and corrective actions to begin without the waterbody having to wait its turn in the monitoring schedule or DEQ constantly shifting its monitoring schedule to address obvious issues.

When overwhelming evidence is not a clear choice, a beneficial use support determination can be made using independent evidence. Independent evidence can be used when there are less than or equal to three data types (biology, habitat, chemical) available or less than two biological assemblages represented. This occurs frequently where external data submitted to DEQ comes from one or two focused studies and there is little other types of data, but the SCD score still achieves 6 or higher. This “independent evidence” may not cover all aspects of the beneficial use but is singularly rigorous to make a determination of non-, partial, or full use support. Independent evidence is used exclusively for aquatic life and fisheries use support determinations.

The weight-of-evidence approach is used when there are three data types (biology, habitat, chemical) and greater than or equal to two biological assemblages. With multiple lines of evidence, there are often conflicting results and conclusions presented to the assessor. Rather than having conflicting data cancel out, the assessor views the weight of the evidence presented as a whole and selects the use support decision from the most rigorous, prevalent indicator. To use weight of evidence, the SCD score must be 6 or higher and is only applied to the aquatic life and fisheries uses.

Beneficial use support determination (Drinking Water, Agricultural, Industry, and Recreation Uses) – These remaining uses are assessed using an “independent⁸²” type approach. Because the water quality standards for these uses are primarily numeric, once data is determined to be sufficient, they are assessed based upon direct data comparison to water quality standards.

When all beneficial uses (or as many as the data allows) are assessed, the assessment decisions are recorded in an assessment record to document the assessment.

Assessment Record

For the period 2000 to 2006, assessments are documented in an electronic spreadsheet in MS Excel. Once completed, a hardcopy is printed and placed in the waterbody’s assessment record. The hardcopy assessment record is catalogued and retained in the WQPB Water Quality Library.

⁸² Although not technically an “Independent Evidence” approach as is used for aquatic life and fisheries, these other assessments have similarities because there is typically only one relevant data type, which is compared against numeric standards (DEQ-7) or numeric recommendations presented in reference condition data.

The full record of DEQ's water quality assessments consists of four parts:

1. The Water Quality Assessment Determinations section of this report, as it appears on the "Clean Water Act Information Center" (CWAIC) Internet site <http://deq.mt.gov/CWAIC/Default.aspx>. This site is Montana's "official" report of state water quality status. Because it would require more than 1,000 pages to print the information provided on the website, any hardcopy version of this report reflects at least some condensation and abridgement of the version posted on the CWAIC site.
2. Water Quality Assessment Records for each Assessment Unit. The State documents the assessment of each waterbody in an Excel spreadsheet designed for Montana's water quality assessment method. These assessment record sheets (ARS) display the data sources used in the assessment, the data quality evaluation performed (SCD), and how the State used these data to reach the beneficial use support determinations. Electronic copies of these ARSs are linked to the CWAIC interactive database "full report" pages. A hard copy of the record sheet for each waterbody segment is included in the segment files described below.
3. Hardcopy data files for each Assessment Unit evaluated. These files may contain water quality data, maps, photographs, references to relevant documents, and references to electronic information sources. Individuals may review these files at the DEQ, Water Quality Planning Bureau.
4. Assessment Database (ADBv2.2). DEQ staff enters the use support decisions recorded in DEQ's Water Quality Assessment Records into the EPA's Assessment Database. This software program produces the majority of the tables and reports comprising this Integrated Water Quality Report. As required by law, the State is required to submit a copy of this database, along with the supporting assessment records to the EPA for approval.

Assessment Unit Changes (New, Split, Merge, and Corrections)

During the 2006 reporting cycle DEQ added or modified 31 waterbodies for assessment purposes (Table 11).

Table 11. Assessment Unit Changes during the 2006 Reporting Cycle

Pre-2006 305(b) ID	2006 305(b) ID	Name	Current Waterbody Description	Type	Comments
MT40B002_040	MT40B002_040	Chippewa Creek	CHIPPEWA CREEK, headwaters to confluence with Manitoba Gulch.	Correction	The previous segment (MT40B002_040) description was unclear.
MT41D003_010	MT41D003_010	Charcoal Creek	CHARCOAL CREEK, headwaters to mouth (Big Hole River)	Correction	This stream was incorrectly named Charcoal Gulch Creek in EnviroNet. Charcoal Gulch Creek is a tributary of Charcoal Creek. Charcoal Creek is a tributary of the Big Hole River.
MT42M002_040	MT42M002_040	Lone Tree Creek	LONE TREE CREEK, North Fork confluence downstream to the mouth	Correction	Segment correction: previous segment description was from the north and south forks to the mouth; however, there is no confluence of north and south forks.
MT43A002_031	MT43A002_031	Cottonwood Creek	COTTONWOOD CREEK, from the Confluence of Trespass Creek to the mouth (Shields River)	Correction	Change in land use (i.e., beginning of irrigation withdraws, primitive to developed conditions).
MT43A002_032	MT43A002_032	Cottonwood Creek	COTTONWOOD CREEK, headwaters downstream to the confluence with Trespass Creek, approximately 17 stream miles upstream from the confluence with the Shields River.	Correction	Change in land use (i.e., primitive to developed conditions).
MT43A002_051	MT43A002_051	Rock Creek	ROCK CREEK, headwaters downstream to USFS boundary at NW1/4, SW1/4, Sec9,T2N, R11E	Correction	Change in land use (i.e., primitive to developed conditions).
MT43A002_052	MT43A002_052	Rock Creek	ROCK CREEK, USFS boundary at NW1/4, SW1/4, Sec9,T2N, R11E downstream to the mouth of the Shields River	Correction	Change in land use (i.e., beginning of irrigation withdraws, primitive to developed conditions).
MT43B004_051	MT43B004_051	Billman Creek	BILLMAN CREEK, 1.31 miles downstream to mouth (Yellowstone River)	Correction	Merged and split MT43B004_051 and MT43B004_052 to reflect different land uses.

Pre-2006 305(b) ID	2006 305(b) ID	Name	Current Waterbody Description	Type	Comments
MT43B004_052	MT43B004_052	Billman Creek	BILLMAN CREEK, headwaters to 1.3 miles from mouth (Yellowstone River)	Correction	Merged and split MT43B004_051 and MT43B004_052 to reflect different land uses.
MT76J008 4	MT76O003_021	Unnamed Creek	UNNAMED CREEK, headwaters to mouth (Spring Creek). This creek is locally referred to as "Kid's Creek"	Correction	This request is to re-establish a segment ID that was mistakenly given to another Spring Creek in 1999. The original ID was MT76J0084.
MT41P002_020	MT41P002_020	Dry Fork Marias River	DRY FORK MARIAS RIVER, headwaters to Big Flat Coulee	Merge	Added section from Big Spring Creek to Big Flat Coulee (MT41P002_010). Segment merged to keep use class consistent.
MT43B004_062	MT43B004_062	Tom Minor Creek	TOM MINER CREEK, headwaters downstream to the confluence with Tepee Creek	Merge	Merged MT43B004_062 and MT43B004_063
MT43B004_112	MT43B004_112	Big Creek	BIG CREEK, headwaters downstream to confluence with Hyalite Creek.	Merge	Merged MT43B004_112 and MT43B004_113
NA	MT41H003_081	Bear Creek	BEAR CREEK, headwaters to the mouth (Rocky Creek MT41H003_080)	New	NA
NA	MT43B005_060	West Fork Mill Creek	WEST FORK MILL CREEK, Absaroka-Beartooth Wilderness boundary to mouth (Mill Creek)	New	Data discovered that may lead to an impairment decision
NA	MT43B006_020	Granite Lake	GRANITE LAKE, Entire lake	New	Data discovered indicates that a priority abandoned mine along a tributary to Granite lake is a source of metals.
NA	MT43D003_140	Lower Basin Creek Lake	LOWER BASIN CREEK LAKE, entire lake located in TS8 R19E S8	New	NA
NA	MT76F003_010	Mike Horse Creek	MIKE HORSE CREEK, headwaters to mouth (Beartrap Creek)	New	NA
NA	MT76N003_140	Swamp Creek	SWAMP CREEK, Cabinet Mountains Wilderness boundary to the mouth (Noxon Reservoir)	New	NA
MT43B004_063	NA	Tom Minor Creek		Removed	Merged MT43B004_062 and MT43B004_064
MT43B004_113	NA	Big Creek		Removed	Merged MT43B004_112 and MT43B004_114

Pre-2006 305(b) ID	2006 305(b) ID	Name	Current Waterbody Description	Type	Comments
MT41B002_090	MT41B002_090	Rattlesnake	RATTLESNAKE CREEK, from the Dillon PWS off-channel well located in T7S R10W S11 to the mouth at the Beaverhead River	Split	This waterbody has two State use classifications: A1 from the headwaters to the point near the Dillon PWS off-channel well, and B1 from that point to the mouth at the Beaverhead R.
MT41B002_090	MT41B002_091	Rattlesnake	RATTLESNAKE CREEK, headwaters to the Dillon PWS off-channel well located in T7S R10W S11	Split	This waterbody has two State use classifications: A1 from the headwaters to the point near the Dillon PWS off-channel well, and B1 from that point to the mouth at the Beaverhead R.
MT41P002_010	MT41P002_010	Dry Fork Marias River	DRY FORK MARIAS RIVER, Big Flat Coulee to the mouth (Marias River)	Split	Remove section from Big Spring Creek to Big Flat Coulee (MT41P002_010). Segment split to keep use class consistent.
MT43B001_010	MT43B001_010	Yellowstone River	YELLOWSTONE RIVER, Yellowstone Park boundary to Reese Creek	Split	The original pre-2006 segment was comprised of two waterbody classes (A-1, B-1). The splits were made in order to place each classified segment into its own reach.
MT43B001_010	MT43B001_011	Yellowstone River	YELLOWSTONE RIVER, Montana State border to Yellowstone Park boundary	Split	The original pre-2006 segment was comprised of two waterbody classes (A-1, B-1). The splits were made in order to place each classified segment into its own reach.
MT43E001_010	MT43E001_010	Pryor Creek	PRYOR CREEK, I-90 to the mouth of the Yellowstone River	Split	The original segment (MT43E001_010) has two water-use classifications B-1 and C-3. The water use classifications change at the I-90 bridge and the current waterbody segment includes both water-use classifications. For ~ 2.8 miles from the Crow Reservation Boundary to I-90 the classification is B-1 (MT43E001_011). From I-90 to the mouth of the Yellowstone River (~13.7 miles) the Classification is C-3 (MT43E001_010).

Pre-2006 305(b) ID	2006 305(b) ID	Name	Current Waterbody Description	Type	Comments
MT43E001_010	MT43E001_011	Pryor Creek	PRYOR CREEK, For 2.75 miles from the Crow Reservation to I-90	Split	The original segment (MT43E001_010) has two water-use classifications B-1 and C-3. The water use classifications change at the I-90 bridge and the current waterbody segment includes both water-use classifications. For ~ 2.8 miles from the Crow Reservation Boundary to I-90 the classification is B-1 (MT43E001_011). From I-90 to the mouth of the Yellowstone River (~13.7 miles) the Classification is C-3 (MT43E001_010).
MT43F001_010	MT43F001_010	Yellowstone River	YELLOWSTONE RIVER, City of Billings PWS to Alkali Creek	Split	The original pre-2006 segment was comprised of three waterbody classes (B-1, B-2 and B-3). The splits were made in order to place each classified segment into its own reach.
MT43F001_010	MT43F001_011	Yellowstone River	YELLOWSTONE RIVER, City of Laurel PWS to City of Billings PWS	Split	The original pre-2006 segment was comprised of three waterbody classes (B-1, B-2 and B-3). The splits were made in order to place each classified segment into its own reach.
MT43F001_010	MT43F001_012	Yellowstone River	YELLOWSTONE RIVER, Bridger Creek to City of Laurel PWS	Split	The original pre-2006 segment was comprised of three waterbody classes (B-1, B-2 and B-3). The splits were made in order to place each classified segment into its own reach.

*AU Correction = AUs are “corrected” if they were reach indexed incorrectly or if their related information (waterbody descriptions and/or location information) was unclear or incorrect

Quality Assurance and Quality Control Program

Within DEQ, the Water Quality Planning Bureau (WQPB) operates under an EPA-approved Quality Management Plan (QMP - WQPBQMP-001, Rev. 1, 05/06/2004). This QMP establishes a quality system for all bureau activities including, but not limited to, the monitoring of state surface waters and the production of this Integrated Water Quality Report.

The QMP requires the bureau to plan projects, document this planning, and to provide for independent assessment and oversight activities to assure scientifically valid processes and data used for decision-making. For water quality monitoring, the bureau plans and documents proposed activities in a Quality Assurance Project Plan (QAPP). The DEQ approved QAPP for water quality monitoring is available for review at the DEQ Quality Assurance webpage⁸³.

The water quality assessment process used for the production of this Integrated Report has been incorporated into the quality system as a Standard Operating Procedure (SOP) and is available online through the QA Program webpage.

Under the auspices of the bureau's QA program a two tiered system of review was initiated for water quality assessments beginning with the 2004 Integrated Report cycle. The bureau SOP WQPBQMP-002⁸⁴ describes the review process used during the 2006 listing cycle.

The two tiered review of assessment records begins with an administrative review checklist, completed for all assessments. A DEQ assessor completes the administrative review checklist at the end of an assessment to verify that all information necessary for a complete and valid entry to the ADB is included.

From the completed assessments submitted for ADB entry, a minimum of 10 percent are randomly selected for technical review. Technical reviews are performed by technically qualified staff in the Water Quality Standards Section.

C.3 Assessment Results***Five-Part Categorization of Surface Waters***

As of 2004, the EPA has requested that states adopt a five-part scheme for categorizing the assessment status of all waters in each state's water quality monitoring and assessment system. In 2004, these five categories were used as follows:

1. Category 1: Waters for which all applicable beneficial uses have been assessed and all uses are determined to be fully supported.
2. Category 2: Waters for which those beneficial uses that have been assessed are fully supported, but some applicable uses have not been assessed.
3. Category 3: Waters for which there is insufficient data to assess the use support of any applicable beneficial use, so no use support determinations have been made.
4. Category 4: Waters where one or more beneficial uses have been assessed as being impaired, fully supporting but threatened, all TMDLs are completed but impaired beneficial uses have not yet achieved fully supporting status, or impaired and TMDLs are not required:
 - a. Subcategory 4A: All TMDLs needed to rectify all identified threats or impairments have been completed and approved.

⁸³Quality Assurance Program DEQ [Internet]. Helena, MT: DEQ. Available from: <http://www.deq.state.mt.us/wqinfo/datamgmt/Index.asp>.

⁸⁴ Montana Department of Environmental Quality (US) [DEQ]. Standard Operating Procedure WQPBQMP-002, Rev. 2, 04/15/05 [online document]. Helena, MT: DEQ; 2006. Available from: <http://www.deq.mt.gov/wqinfo/QAProgram/SOP%20WQPBQMP-002.pdf>.

- b. Subcategory 4B: Waterbodies are on lands where “other pollution control requirements required by local, State, or Federal authority” [see 40 CFR 130.7(b)(1)(iii)] are in place, are expected to address all waterbody-pollutant combinations, and attain all water quality standards in a reasonable period of time. These control requirements act “in lieu of” a TMDL, thus no actual TMDLs are required.
 - c. Subcategory 4C: Identified threats or impairments result from pollution categories such as dewatering or habitat modification and, thus, the calculation of a Total Maximum Daily Load (TMDL) is not required.
5. Category 5: Waters where one or more applicable beneficial uses have been assessed as being impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat.

In 2006 EPA revised the definition of Category 2 waters as follows:

2004 Definition - Category 2: Waters for which those beneficial uses that have been assessed are fully supported, but some applicable uses have not been assessed.

2006 Definition - Category 2: Available data and/or information indicate that some, but not all of the beneficial uses are supported.

With EPA’s revised definition for 2006, the underlying theme for Category 2 changed from a category for partially completed assessments, to one that could, by definition, also contain waters with water quality standards exceedences due solely to natural sources.

For the 2006, the Category 2 definition from EPA’s 2006 Guidance document is applied to a new sub-Category 2A. A new Category 2B is used to categorize waters determined to have a water quality standard exceedence due solely to natural sources in the absence of any identified anthropogenic sources. The full definitions for these categories are as follows:

2006 – Category 2A: Available data and/or information indicate that some, but not all of the beneficial uses are supported.

2006 – Category 2B: Available data and/or information indicate that a water quality standard is exceeded due to an apparent natural source in the absence of any identified anthropogenic sources.

Out of the 20,549 miles of streams documented in the ADB to date, 10, 3, 12, 4, 0, 8, and 62 percent are in categories 1, 2, 3, 4A, 4B, 4C, and 5, respectively (Table 12). Similarly, out of the 606,291 acres of lakes documented in the ADB to date, 10, 2, 4, 0, 0, 6, and 77 percent are in categories 1, 2, 3, 4A, 4B, 4C, and 5, respectively (Table 12). Category 5 is the predominant category for both lakes and streams. For streams and rivers, category 2A and 2B waters represent 3 and 4 percent of the total stream miles documented in the ADB to date, respectively. For lakes, ponds, and wetlands, category 2A and 2B waters represent 2 and 0 percent of the total lake acres documented in the ADB to date, respectively. A list of all category 2B waters is available in Table 13.

Table 12. Size of Surface Waters Assigned to Reporting Categories

Category	Streams and Rivers		Lakes and Wetlands	
	Total Size (Miles)	Number of Assessment Units	Total Size (Acres)	Number of Assessment Units
1	2,122	122	63,640	15
2	666	32	10,843	11
2A	542	29	10,843	11
2B	799	26	0	0
3	2,547	84	26,483	9

Category	Streams and Rivers		Lakes and Wetlands	
	Total Size (Miles)	Number of Assessment Units	Total Size (Acres)	Number of Assessment Units
4A	801	49	2,980	2
4B	0	0	0	0
4C	1,731	98	37,738	3
5	12,683	651	464,607	26
Total Waters	20,549	1,036	606,291	66

*Category 2A waters are a subset of category 2 waters.

**Category 2B waters can be a subset of category 2, 3, 4A, 4B, 4C, or 5 waters.

Table 13. Category 2B waters

Watershed	HUC #	ID305B	Name, Location Description
Little Missouri	10110201	MT39F001_010	THOMPSON CREEK, State line to mouth
Lower Missouri	10060003	MT40Q001_010	POPLAR RIVER & MIDDLE FORK POPLAR RIVER, Canada to the Fort Peck Reservation
Lower Missouri	10060003	MT40Q002_010	BUTTE CREEK, headwaters to the mouth (Poplar River)
Lower Missouri	10060003	MT40Q002_020	EAST FORK POPLAR RIVER, international border to the mouth (Poplar River)
Lower Yellowstone	10100004	MT42M002_142	CEDAR CREEK, 26 to 45 miles above the mouth
Marias	10030201	MT41M002_110	DUPUYER CREEK, North & South Forks to the mouth (Birch Creek)
Marias	10030202	MT41L001_010	OLD MAIDS COULEE, headwaters to the mouth (Cutbank Creek)
Marias	10030203	MT41P001_022	MARIAS RIVER, county road crossing in T29N R6E Sec17 to mouth (Missouri River)
Middle Missouri	10040102	MT41R001_020	ARROW CREEK, Surprise Creek to the mouth (Missouri River)
Middle Yellowstone	10100001	MT42K002_170	EAST FORK ARMELLS CREEK, headwaters to Colstrip
Milk	10050010	MT40J005_020	COTTONWOOD CREEK, Black Coulee to the mouth (Milk River)
Milk	10050012	MT40O002_010	CHERRY CREEK, headwaters to the mouth (Milk River)
Milk	10050012	MT40O002_040	BEAVER CREEK, confluence of Little Beaver Creek and South Fork Beaver Creek (headwaters) to mouth (Willow Creek) south of Glasgow
Milk	10050014	MT40M002_020	LARB CREEK, headwaters to mouth (Beaver Creek)
Missouri-Sun-Smith	10030101	MT41I001_011	MISSOURI RIVER, headwaters to Toston Dam
Missouri-Sun-Smith	10030102	MT41Q001_021	MISSOURI RIVER, Little Prickly Pear Creek to Sheep Creek
Musselshell	10040201	MT40A002_020	ANTELOPE CREEK, headwaters to the mouth (Musselshell River)
Musselshell	10040205	MT40C004_020	LODGEPOLE CREEK, North & Middle Fork Lodgepole Creeks to the mouth (Musselshell River)
Upper Missouri Tribs.	10020004	MT41D004_230	SAWLOG CREEK, headwaters to mouth (Big Hole River)
Upper Yellowstone	10070004	MT43F002_022	CANYON CREEK, headwaters to highway 532
Upper Yellowstone	10070004	MT43F002_030	KEYSER CREEK, headwaters to the mouth (Yellowstone River)
Upper Yellowstone	10070004	MT43F002_040	VALLEY CREEK, headwaters to the mouth (Yellowstone River)

Watershed	HUC #	ID305B	Name, Location Description
Upper Yellowstone	10070006	MT43D002_010	ELBOW CREEK, headwaters to the mouth (Clarks Fork)
Upper Yellowstone	10070006	MT43D002_100	SILVERTIP CREEK, state line to the mouth (Clarks Fork)
Upper Yellowstone	10070006	MT43D002_140	COTTONWOOD CREEK, headwaters to the mouth (Clarks Fork of Yellowstone)
Upper Yellowstone	10070006	MT43D002_180	SOUTH FORK BRIDGER CREEK, tributary to Bridger Creek

Results of Probability-based Surveys

Section 303(d) List

Montana's 303(d) list includes 651 stream AUs, 26 lake AUs, and 13,450 AU/Beneficial Use/Cause/Source combinations (Appendix H, Section 3). This list includes all Category 5 impaired waters. Please refer to Appendix F for the most current TMDL development schedule that includes these waters. A list of category 4A and 4C impaired waters is located in Appendix H, Sections 1 and 2, respectively. Between the 2004 and 2006 integrated reporting cycle there were 57 de-listings (Table 14)⁸⁵.

⁸⁵ EPA and DEQ use "de-listing" to refer to a change in water quality category from 5 to 4a or 4b, 5 to 1 or 2 or removal of a cause from an impaired water.

Table 14. AU/Pollutant combinations removed from the State's Year 2004 Section 303(d) List

Watershed	HUC #	ID305B	Name, Description	Cause of Impairment	De-Listing Reason	De-listing Date
Flathead	17010206	MT76Q002_020	RED MEADOW CREEK, headwaters to mouth (North Fork Flathead River)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
		MT76Q002_030	WHALE CREEK, headwaters to mouth (North Fork Flathead River)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
		MT76Q002_040	SOUTH FORK COAL CREEK, headwaters to mouth (Coal Creek)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
		MT76Q002_070	COAL CREEK, headwaters to South Fork	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
		MT76Q002_080	COAL CREEK, South Fork to mouth (North Fork Flathead)	Sedimentation/Siltation	EPA approval of TMDL (4A)	24-May-05
	17010207	MT76I002_010	GRANITE CREEK, Confluence of Dodge Creek & Challenge Creek to mouth (Middle Fork Flathead)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
		MT76I002_050	MORRISON CREEK, headwaters to mouth (Middle Fork Flathead River)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Dec-04
	17010211	MT76K002_010	SWAN LAKE	Sedimentation/Siltation	EPA approval of TMDL (4A)	31-Aug-04
		MT76K003_010	JIM CREEK, West Fork to mouth (Swan River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	31-Aug-04
		MT76K003_031	GOAT CREEK, headwaters to Squeezer Creek	Nitrate/Nitrite (Nitrite + Nitrate as N)	State Determines water quality standard is being met	31-Aug-04
				Nitrogen (Total)	State Determines water quality standard is being met	31-Aug-04
				Phosphorus (Total)	State Determines water quality standard is being met	31-Aug-04
				Total Suspended Solids (TSS)	EPA approval of TMDL (4A)	31-Aug-04
		MT76K003_032	GOAT CREEK, Squeezer Creek to mouth (Swan River)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Aug-04
		MT76K003_062	PIPER CREEK, Moore Creek to mouth (Swan River)	Sedimentation/Siltation	State Determines water quality standard is being met	31-Aug-04
Kootenai	17010101	MT76D002_080	BOBTAIL CREEK, headwaters to mouth (Kootenai River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	27-Apr-05
				Turbidity	EPA approval of TMDL (4A)	27-Apr-05
		MT76D004_060	GRAVE CREEK, Foundation Creek to the mouth (Fortine Creek)	Sedimentation/Siltation	EPA approval of TMDL (4A)	10-May-05
Lower Clark Fork	17010204	MT76M004_010	NINEMILE CREEK, headwaters to the mouth (Clark Fork River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	26-Jul-05

Watershed	HUC #	ID305B	Name, Description	Cause of Impairment	De-Listing Reason	De-listing Date
Lower Clark Fork	17010204	MT76M004_040	JOSEPHINE CREEK, headwaters to the mouth (Ninemile Creek)	Sedimentation/Siltation	EPA approval of TMDL (4A)	26-Jul-05
		MT76M004_060	CEDAR CREEK, headwaters to the mouth (Ninemile Creek)	Sedimentation/Siltation	EPA approval of TMDL (4A)	26-Jul-05
		MT76M004_070	KENNEDY CREEK, headwaters to the mouth (Ninemile Creek)	Copper	EPA approval of TMDL (4A)	26-Jul-05
				Lead	EPA approval of TMDL (4A)	26-Jul-05
				Mercury	EPA approval of TMDL (4A)	26-Jul-05
				Sedimentation/Siltation	EPA approval of TMDL (4A)	26-Jul-05
				Zinc	EPA approval of TMDL (4A)	26-Jul-05
Marias	10030104	MT41K004_030	FREEZEOUT LAKE	Selenium	EPA approval of TMDL (4A)	23-Feb-05
				Sulfates	EPA approval of TMDL (4A)	23-Feb-05
				Total Dissolved Solids	EPA approval of TMDL (4A)	23-Feb-05
Middle Missouri	10040103	MT41S004_010	BIG SPRING CREEK, East Fork Big Spring Creek to Casino Creek	Polychlorinated biphenyls	EPA approval of TMDL (4A)	29-Sep-05
		MT41S004_020	BIG SPRING CREEK, East Fork to mouth (Judith River)	Phosphorus (Total)	EPA approval of TMDL (4A)	29-Sep-05
				Polychlorinated biphenyls	EPA approval of TMDL (4A)	25-Sep-05
				Sedimentation/Siltation	EPA approval of TMDL (4A)	29-Sep-05
Missouri-Sun-Smith	10030102	MT41Q003_020	MIDDLE FORK OF THE DEARBORN RIVER, headwaters to the mouth (Dearborn River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	25-May-05
		MT41Q003_030	SOUTH FORK OF THE DEARBORN RIVER, headwaters to the mouth (Dearborn River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	25-May-05
		MT41Q003_040	FLAT CREEK, Henry Creek to the mouth (Dearborn River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	25-May-05
	10030104	MT41K001_010	SUN RIVER, Gibson Dam to Muddy Creek	Sedimentation/Siltation	EPA approval of TMDL (4A)	23-Feb-05
				Temperature, water	EPA approval of TMDL (4A)	23-Feb-05
		MT41K001_020	SUN RIVER, Muddy Creek to the mouth (Missouri River)	Nitrogen (Total)	EPA approval of TMDL (4A)	23-Feb-05

Watershed	HUC #	ID305B	Name, Description	Cause of Impairment	De-Listing Reason	De-listing Date
Missouri-Sun-Smith	10030104	MT41K001_020	SUN RIVER, Muddy Creek to the mouth (Missouri River)	Phosphorus (Total)	EPA approval of TMDL (4A)	23-Feb-05
				Salinity	State Determines water quality standard is being met	23-Feb-05
				Sedimentation/Siltation	EPA approval of TMDL (4A)	23-Feb-05
				Sulfates	State Determines water quality standard is being met	23-Feb-05
				Total Dissolved Solids	State Determines water quality standard is being met	23-Feb-05
				Total Suspended Solids (TSS)	EPA approval of TMDL (4A)	23-Feb-05
		MT41K002_010	MUDDY CREEK, headwaters to the mouth (Sun River)	Nitrogen (Total)	EPA approval of TMDL (4A)	23-Feb-05
				Phosphorus (Total)	EPA approval of TMDL (4A)	23-Feb-05
				Salinity	EPA approval of TMDL (4A)	23-Feb-05
				Sedimentation/Siltation	EPA approval of TMDL (4A)	23-Feb-05
				Selenium	EPA approval of TMDL (4A)	23-Feb-05
				Sulfates	EPA approval of TMDL (4A)	23-Feb-05
				Temperature, water	EPA approval of TMDL (4A)	23-Feb-05
				Total Dissolved Solids	EPA approval of TMDL (4A)	23-Feb-05
Upper Clark Fork	17010203	MT41K002_020	FORD CREEK, from mouth 2 miles upstream (Smith Creek-Elk Creek-Sun River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	23-Feb-05
		MT76F001_020	BLACKFOOT RIVER, Landers Fork to Nevada Creek	Sedimentation/Siltation	EPA approval of TMDL (4A)	19-May-04
		MT76F002_030	POORMAN CREEK, headwaters to the mouth (Blackfoot River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	19-May-04
		MT76F002_070	ARRASTRA CREEK, headwaters to mouth (Blackfoot River)	Sedimentation/Siltation	EPA approval of TMDL (4A)	19-May-04

*Designated Use Support Summaries***Streams and Rivers**

To date, aquatic life, cold water fisheries, warm water fisheries, drinking water, primary contact recreation, agriculture, and industrial stream beneficial uses that are fully supported are 15, 14, 13, 53, 44, 75, and 76 percent, respectively (Table 15). Similarly, to date, aquatic life, cold water fisheries, warm water fisheries, drinking water, primary contact recreation, agriculture, and industrial stream beneficial uses that are not supported are 67, 73, 60, 23, 27, 9, and 9 percent, respectively (Table 15).

Table 15. Rivers and Streams Designated Use Support Summary

Clean Water Act Goals	Use	Total Size (Miles)	Size Assessed (Miles)	Size Fully Supporting (Miles)	Size Fully Supporting and Threatened (Miles)	Size Not Supporting (Miles)	Size Not Assessed (Miles)	Size with Insufficient Info (Miles)
Protect & Enhance Ecosystem	Aquatic Life	20,549	16,922	3,145	0	13,776	3,242	385
	Cold Water Fishery	11,824	10,246	1,658	0	8,588	1,085	493
	Warm Water Fishery	8,925	6,486	1,150	0	5,336	2,014	425
Protect & Enhance Public Health	Drinking Water	14,717	11,191	7,759	0	3,432	3,228	298
	Primary Contact Recreation	20,549	14,803	9,034	136	5,632	4,925	822
Social & Economic	Agricultural	14,765	12,450	11,124	0	1,326	2,091	224
	Industrial	14,765	12,599	11,227	0	1,372	1,961	206

*Includes waters that are partially supporting their beneficial uses.

The top 10 percent of causes of stream impairment represented in the State's ADB, based on percent total impaired stream miles are copper, lead, phosphorus (Total), sedimentation/siltation, water temperature, and Total Kjeldahl Nitrogen (TKN) (Table 16). Sedimentation/siltation is the leading cause of stream impairment the DEQ has identified to date. Approximately 42 percent of the percent total impaired stream miles are impaired by this pollutant. Montana's second leading cause of stream impairment is Phosphorous (Total). It affects 29 percent or 4,472 miles of impaired streams. Lead, Total Kjeldahl Nitrogen, copper, and water temperature effect approximately 20, 18, 18, and 15 percent of impaired streams, respectively.

Table 16. Causes of Stream Impairment in Montana

Cause	Segments Impaired	% of Total Impaired Segments	Miles Impaired	% Total Miles Impaired
Alterations in wetland habitats	1	0.13	12	0.08
Aluminum	21	2.63	290	1.90
Ammonia (Total)	3	0.38	63	0.41
Ammonia (Un-ionized)	7	0.88	228	1.50
Antimony	6	0.75	71	0.46
Arsenic	102	12.78	1,383	9.09
Barium	1	0.13	11	0.07

Cause	Segments Impaired	% of Total Impaired Segments	Miles Impaired	% Total Miles Impaired
Benthic-Macroinvertebrate Bioassessments (Streams)	4	0.50	65	0.42
Beryllium	1	0.13	5	0.03
BOD, Biochemical oxygen demand	1	0.13	51	0.34
Bottom Deposits	3	0.38	29	0.19
Cadmium	95	11.90	1,500	9.86
Chloride	1	0.13	16	0.11
Chlorophyll-a	77	9.65	1,475	9.69
Chromium (total)	10	1.25	301	1.98
Cobalt	1	0.13	11	0.07
Combined Biota/Habitat Bioassessments (Streams)	1	0.13	12	0.08
Copper	140	17.54	2,783	18.29
Cyanide	5	0.63	72	0.47
DDE	1	0.13	22	0.14
Dissolved Gas Supersaturation	1	0.13	3	0.02
<i>Escherichia coli</i>	3	0.38	75	0.49
Excess Algal Growth	20	2.51	308	2.02
Fecal Coliform	14	1.75	434	2.85
Habitat Assessment (Streams)	1	0.13	87	0.57
Iron	65	8.15	1,714	11.26
Lead	154	19.30	3,024	19.88
Manganese	14	1.75	143	0.94
Mercury	65	8.15	1,761	11.58
Mercury in Water Column	1	0.13	18	0.12
Nickel	8	1.00	167	1.10
Nitrate/Nitrite (Nitrite + Nitrate as N)	92	11.53	2,065	13.57
Nitrates	13	1.63	307	2.01
Nitrogen (Total)	71	8.90	1,628	10.70
Nitrogen, Nitrate	12	1.50	223	1.46
Nonnative Fish, Shellfish, or Zooplankton	1	0.13	10	0.06
Nutrient/Eutrophication Biological Indicators	3	0.38	26	0.17
Oil and Grease	1	0.13	24	0.16
Organic Enrichment (Sewage) Biological Indicators	4	0.50	182	1.19
Other	1	0.13	106	0.70
Oxygen, Dissolved	14	1.75	448	2.94
PCB in Water Column	1	0.13	24	0.16
Pentachlorobenzene	2	0.25	18	0.12
pH	20	2.51	344	2.26
Phosphate	1	0.13	10	0.07
Phosphorus (Total)	210	26.32	4,472	29.39
Polychlorinated biphenyls	2	0.25	31	0.20
Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)	1	0.13	18	0.12
Salinity	17	2.13	766	5.04
Sedimentation/Siltation	411	51.50	6,362	41.82
Selenium	18	2.26	321	2.11
Silver	12	1.50	141	0.92
Sodium	1	0.13	37	0.24

Cause	Segments Impaired	% of Total Impaired Segments	Miles Impaired	% Total Miles Impaired
Solids (Suspended/Bedload)	41	5.14	983	6.46
Specific Conductance	9	1.13	392	2.57
Sulfates	12	1.50	595	3.91
Temperature, water	92	11.53	2,243	14.74
Thallium	1	0.13	5	0.04
Total Dissolved Solids	23	2.88	1,177	7.74
Total Kjeldahl Nitrogen (TKN)	111	13.91	2,729	17.94
Total Suspended Solids (TSS)	5	0.63	99	0.65
Turbidity	14	1.75	156	1.02
Uranium	1	0.13	81	0.53
Zinc	92	11.53	1,564	10.28
Total Impaired*	798		15,215	

*These totals represent the total number and size of segments impaired by one or more causes.

The top 10 percent of sources of stream impairment represented in the State's ADB, based on percent total impaired stream miles are agriculture, grazing in riparian or shoreline zones, source unknown, irrigated crop production, natural sources, streambank modifications/destabilization, and rangeland grazing, (Table 17). Agriculture is the leading source of stream impairment the DEQ has identified to date. Approximately 35 percent of the percent total impaired stream miles are impaired from this source. Montana's second leading source of stream impairment is Grazing in Riparian or Shoreline Zones. It affects 34 percent or 5,198 miles of impaired streams. Source unknown, irrigated crop production, natural sources, streambank modification/destabilization, and impacts from hydrostructure flow regulation/modification are the source of impairment for approximately 28, 26, 22, 15, and 14 percent of impaired streams, respectively.

Table 17. Size of Rivers and Streams Impaired by Sources

Source	Segments Impaired	% of Total Segments Impaired	Miles Impaired	% of Total Miles Impaired
Above Ground Storage Tank Leaks (Tank Farms)	1	0.13	105	0.69
Acid Mine Drainage	59	7.39	649	4.26
Agriculture	189	23.68	5,349	35.15
Animal Feeding Operations (NPS)	18	2.26	405	2.66
Aquaculture (Permitted)	4	0.50	50	0.33
Atmospheric Deposition - Nitrogen	1	0.13	37	0.24
Atmospheric Deposition - Toxics	6	0.75	42	0.27
Baseflow Depletion from Groundwater Withdrawals	1	0.13	5	0.03
Channel Erosion/Incision from Upstream Hydromodifications	3	0.38	49	0.32
Channelization	93	11.65	1,857	12.20
Coal Mining	2	0.25	62	0.41
Construction Stormwater Discharge (Permitted)	1	0.13	14	0.09
Contaminated Sediments	25	3.13	309	2.03

Source	Segments Impaired	% of Total Segments Impaired	Miles Impaired	% of Total Miles Impaired
Crop Production (Crop Land or Dry Land)	20	2.51	579	3.81
Crop Production with Subsurface Drainage	1	0.13	45	0.29
Dam Construction (Other than Upstream Flood Control Projects)	15	1.88	557	3.66
Dam or Impoundment	27	3.38	1,356	8.91
Discharges from Municipal Separate Storm Sewer Systems (MS4)	1	0.13	12	0.08
Dredge Mining	14	1.75	133	0.88
Drought-related Impacts	5	0.63	109	0.71
Erosion from Derelict Land (Barren Land)	1	0.13	2	0.01
Flow Alterations from Water Diversions	72	9.02	1,401	9.21
Forest Roads (Road Construction and Use)	95	11.90	953	6.27
Freshettes or Major Flooding	1	0.13	11	0.07
Golf Courses	3	0.38	168	1.10
Grazing in Riparian or Shoreline Zones	299	37.47	5,198	34.16
Habitat Modification - other than Hydromodification	30	3.76	498	3.27
Hardrock Mining Discharges (Permitted)	1	0.13	36	0.24
Heap-leach Extraction Mining	2	0.25	5	0.03
Highway/Road/Bridge Runoff (Non-construction Related)	45	5.64	694	4.56
Highways, Roads, Bridges, Infrastructure (New Construction)	52	6.52	1,050	6.90
Hydrostructure Impacts on Fish Passage	7	0.88	125	0.82
Impacts from Abandoned Mine Lands (Inactive)	152	19.05	1,890	12.42
Impacts from Hydrostructure Flow Regulation/modification	77	9.65	2,061	13.54
Impacts from Resort Areas (Winter and Non-winter Resorts)	2	0.25	93	0.61
Industrial Point Source Discharge	10	1.25	249	1.64
Industrial/Commercial Site Stormwater Discharge (Permitted)	1	0.13	8	0.05
Irrigated Crop Production	188	23.56	3,920	25.76
Livestock (Grazing or Feeding Operations)	8	1.00	125	0.82
Loss of Riparian Habitat	73	9.15	1,711	11.24

Source	Segments Impaired	% of Total Segments Impaired	Miles Impaired	% of Total Miles Impaired
Low Water Crossing	2	0.25	47	0.31
Managed Pasture Grazing	4	0.50	90	0.59
Mill Tailings	26	3.26	403	2.65
Mine Tailings	57	7.14	505	3.32
Municipal (Urbanized High Density Area)	1	0.13	7	0.05
Municipal Point Source Discharges	22	2.76	735	4.83
Natural Sources	116	14.54	3,301	21.69
Non-irrigated Crop Production	14	1.75	642	4.22
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	10	1.25	97	0.63
Open Pit Mining	3	0.38	7	0.05
Other Recreational Pollution Sources	2	0.25	21	0.14
Permitted Runoff from Confined Animal Feeding Operations (CAFOs)	1	0.13	51	0.34
Petroleum/natural Gas Production Activities (Permitted)	1	0.13	18	0.12
Pipeline Breaks	1	0.13	18	0.12
Placer Mining	33	4.14	277	1.82
Post-development Erosion and Sedimentation	3	0.38	116	0.76
Rangeland Grazing	86	10.78	2,102	13.81
Residential Districts	4	0.50	185	1.22
Sediment Resuspension (Clean Sediment)	2	0.25	31	0.20
Sediment Resuspension (Contaminated Sediment)	1	0.13	23	0.15
Septage Disposal	2	0.25	9	0.06
Silviculture Activities	79	9.90	880	5.78
Silviculture Harvesting	47	5.89	492	3.24
Site Clearance (Land Development or Redevelopment)	20	2.51	465	3.06
Source Unknown	161	20.18	4,206	27.65
Sources Outside State Jurisdiction or Borders	1	0.13	3	0.02
Spills from Trucks or Trains	1	0.13	26	0.17
Streambank Modifications/destabilization	100	12.53	2,308	15.17

Source	Segments Impaired	% of Total Segments Impaired	Miles Impaired	% of Total Miles Impaired
Subsurface (Hardrock) Mining	31	3.88	309	2.03
Surface Mining	15	1.88	142	0.94
Transfer of Water from an Outside Watershed	8	1.00	180	1.18
Unspecified Unpaved Road or Trail	49	6.14	558	3.67
Unspecified Urban Stormwater	1	0.13	29	0.19
Upstream Impoundments (e.g., PI-566 NRCS Structures)	7	0.88	129	0.85
Upstream Source	7	0.88	73	0.48
Watershed Runoff following Forest Fire	5	0.63	90	0.59
Wet Weather Discharges (Non-Point Source)	1	0.13	15	0.10
Wet Weather Discharges (Point Source and Combination of Stormwater, SSO or CSO)	3	0.38	84	0.55
Yard Maintenance	3	0.38	26	0.17
Total Impaired*	798		15,215	

*These totals represent the total number and size of segments impaired by one or more sources.

Lakes

To date, aquatic life, cold water fisheries, warm water fisheries, drinking water, primary contact recreation, agriculture, and industrial lake beneficial uses that are fully supported are 19, 40, 47, 38, 41, 43, and 51 percent, respectively (Table 18). Similarly, to date, aquatic life, cold water fisheries, warm water fisheries, drinking water, primary contact recreation, agriculture, and industrial beneficial uses that are not supported are 35, 9, 47, 51, 52, 9, and 1 percent, respectively (Table 18).

Table 18. Lakes Designated Use Support Summary

Clean Water Act Goals	Use	Total Size	Size Assessed	Size Fully Supporting	Size Fully Supporting and Threatened	Size Not Supporting	Size Not Assessed	Size with Insufficient Info
		(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)
Protect & Enhance Ecosystem	Aquatic Life	606,291	332,905	114,860	6,030	212,015	273,386	0
	Cold Water Fishery	550,861	273,300	219,815	6,030	47,456	277,561	0
	Warm Water Fishery	55,430	51,921	25,940	0	25,981	3,509	0
Protect & Enhance Public Health	Drinking Water	596,332	532,204	227,239	0	304,965	64,128	0
	Primary Contact Recreation	606,291	565,744	250,889	0	314,855	40,547	0
Social & Economic	Agricultural	594,723	308,809	254,234	0	54,575	285,914	0
	Industrial	594,723	312,914	305,217	0	7,697	281,810	0

*Includes waters that are partially supporting their beneficial uses.

The top 10 percent of causes of lake impairment represented in the State's ADB, based on percent total acres impaired are lead and mercury (Table 19). Mercury is the leading cause of lake impairment the DEQ has identified to date. Approximately 78 percent (392,276 acres) of the total impaired lake acres are impaired by this pollutant. Montana's second leading cause of lake impairment, based on percent total acres impaired is lead. It affects 51 percent (257,122 acres) of the total impaired lake acres.

Table 19. Size of Lakes Impaired by Causes

Cause	Waterbodies Impaired	% of Total Waterbodies Impaired	Acres Impaired	% Total Acres Impaired
Ammonia (Un-ionized)	1	3.23	35,180	6.96
Arsenic	4	12.90	36,809	7.28
Cadmium	2	6.45	8,619	1.71
Chlorophyll-a	2	6.45	5,020	0.99
Chromium (total)	1	3.23	3,781	0.75
Copper	2	6.45	1,923	0.38
DDT	1	3.23	3,800	0.75
Endosulfan	1	3.23	3,800	0.75
Endrin aldehyde	1	3.23	3,800	0.75
Excess Algal Growth	2	6.45	40,780	8.07
Iron	1	3.23	1,903	0.38
Lead	5	16.13	257,122	50.88
Mercury	7	22.58	392,276	77.63
Nitrogen (Total)	2	6.45	131,607	26.04
Other	1	3.23	80	0.02
Oxygen, Dissolved	2	6.45	4,153	0.82
pH	1	3.23	20	0.00
Phosphorus (Total)	4	12.90	133,761	26.47
Polychlorinated biphenyls	2	6.45	129,357	25.60
Salinity	7	22.58	13,972	2.76
Sedimentation/Siltation	6	19.35	135,722	26.86
Selenium	5	16.13	13,575	2.69
Sulfates	3	9.68	9,400	1.86
Thallium	1	3.23	35,180	6.96
Total Dissolved Solids	2	6.45	3,800	0.75
Total Kjeldahl Nitrogen (TKN)	1	3.23	353	0.07
Zinc	1	3.23	20	0.00
Total Impaired*	31		505,325	

*These totals represent the total number and size of waterbodies impaired by one or more causes.

The top 10 percent of sources of lake impairment represented in the State's ADB, based on percent total impaired lake acres are agriculture, atmospheric deposition – toxics, and impacts from abandoned mine lands (Inactive) (Table 20). Agriculture is the leading source of lake impairment the DEQ has identified to date. Approximately 61 percent of the percent total impaired lake acres are impaired from this source. Montana's second leading source of lake impairment is impacts from abandoned mine lands (Inactive). It affects 58 percent or 291,081 acres of impaired lakes. Montana's third leading source of lake impairment is from atmospheric deposition – toxics. It affects 51 percent or 259,099 acres of impaired lakes.

Table 20: Size of Lakes Impaired by Sources

Source	Waterbodies Impaired	% of Total Waterbodies Impaired	Acres Impaired	% of Total Acres Impaired
Acid Mine Drainage	3	9.68	40,561	8.03
Agriculture	15	48.39	309,209	61.19
Atmospheric Deposition - Nitrogen	1	3.23	126,007	24.94
Atmospheric Deposition - Toxics	3	9.68	259,099	51.27
Dam or Impoundment	2	6.45	32,350	6.40
Drought-related Impacts	1	3.23	4,888	0.97
Forest Roads (Road Construction and Use)	2	6.45	6,030	1.19
Grazing in Riparian or Shoreline Zones	3	9.68	4,852	0.96
Habitat Modification - other than Hydromodification	1	3.23	3,781	0.75
Highway/Road/Bridge Runoff (Non-construction Related)	1	3.23	3,800	0.75
Highways, Roads, Bridges, Infrastructure (New Construction)	3	9.68	3,364	0.67
Historic Bottom Deposits (Not Sediment)	2	6.45	250,500	49.57
Impacts from Abandoned Mine Lands (Inactive)	6	19.35	291,081	57.60
Impacts from Hydrostructure Flow Regulation/modification	7	22.58	143,389	28.38
Inappropriate Waste Disposal	1	3.23	5,500	1.09
Internal Nutrient Recycling	1	3.23	35,180	6.96
Irrigated Crop Production	7	22.58	23,290	4.61
Low Water Crossing	1	3.23	1,126	0.22
Municipal Point Source Discharges	3	9.68	164,687	32.59
Natural Sources	5	16.13	46,264	9.16
Non-irrigated Crop Production	1	3.23	675	0.13
On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)	1	3.23	35,180	6.96
Petroleum/natural Gas Activities	1	3.23	9	0.00
Placer Mining	1	3.23	5,500	1.09
Rangeland Grazing	2	6.45	3,332	0.66
Silviculture Activities	3	9.68	8,670	1.72
Silviculture Harvesting	1	3.23	126,007	24.94
Site Clearance (Land Development or Redevelopment)	1	3.23	35,180	6.96
Source Unknown	9	29.03	156,792	31.03
Unspecified Urban Stormwater	1	3.23	126,007	24.94
Upstream Impoundments (e.g., PI-566 NRCS Structures)	1	3.23	126,007	24.94
Upstream Source	2	6.45	3,332	0.66
Upstream/Downstream Source	1	3.23	353	0.07
Total Impaired*	31		505,325	

*These totals represent the total number and size of waterbodies impaired by one or more sources.

CWA Section 314 (Clean Lakes Program)

The last year DEQ received federal CWA Section 314 funds for the Clean Lakes Program was in 1994. Since 1998, when this grant was closed, Montana has been unable to support the Clean Lakes Program due to lack of funding. Table 21 and Table 22 represent the limited information DEQ has on lake trophic status and water quality trends.

Trophic Status and Trend Analysis

The DEQ has limited data to evaluate lakes in the state, nonetheless, some assessment of lake trophic status (Table 21) and water quality trend (Table 22) were entered into DEQ's ADB. Out of the 62 (604,579 acres) lakes represented in the ADB, 60 have been assessed for trophic status. Fifty-three percent of the assessed lakes in Montana are Mesotrophic, 34 percent are Oligotrophic, and 6 percent are Eutrophic. Similarly, out of the 62 lakes represented in the ADB, only 11 have been assessed for trends, 4 of these lakes have been characterized as stable and 7 as unknown.

Table 21: Trophic Status of Significant Publicly Owned Lakes

Trophic Status	Number of Lakes	Total Size (Acres)
Dystrophic	0	0
Eutrophic	10	38,546
Hypereutrophic	0	0
Mesotrophic	16	319,106
Oligotrophic	10	207,428
Unknown	24	39,483

Table 22: Trends in Lake Quality

Trend	Number	Acres
Stable	4	22,410.1
Unknown	7	269,844.4
Total Assessed for Trends	11	292,255

C.4. Wetlands Program

Please refer to section C.1 Monitoring Program for material related to the State's Wetland Program.

C.5 Trend Analysis for Surface Waters

Please refer to section C.3 Assessment Results for material related to surface water trends.

C.6 Public Health Issues

This sub-section provides information on fish kills, fish consumption advisories, the state's public water supplies, public health issues, and information on Montana's programs related to regulated drinking water supplies.

Fish Kills

Three fish kills were reported to the Montana Department of Fish Wildlife and Parks (FWP) from 2004 and 2006⁸⁶:

1. Clark Fork River near Deer Lodge, July 17 - 28, 2004. A FWP employee reported approximately 7 - 9 dead fish (unidentified species). The cause of the fish kill is not known.
2. Boulder River near Boulder, October 28, 2004. An individual reported six fish (unidentified species) that were killed in one eddy of the river. The cause of the fish kill is not known.
3. Lake Koocanusa near Five Mile Creek, August 15, 2005. A MTFWP employee reported over 10,000 dead Kokanee. The cause of the fish kill is not known.

⁸⁶ Skaar, D. RE: Request for Information related to fish kills, dewatered streams, and fish consumption advisories 2006 June 29, 9:49 am [cited 2006 June 29].

Fish Consumption Advisories

The Montana Department of Public Health and Human Services (DPHHS) issues sport fishing consumption guidelines each year. During 2005, the DPHHS issued fish consumption advisories for fish from lakes and rivers that have been tested for mercury and PCBs from over 20 locations in Montana (Table 23)⁸⁷.

Table 23. Laboratory Test Results: Mercury and PCBs in Fish in Montana (Concentration Expressed in Micrograms per Gram of Fish)⁸⁸

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg ¹	PCB
Bighorn Lake Bighorn County	Walleye	9.8 - 15.1	0.20	nd2
		19.2 - 20.7	0.58	nd
		27.0 - 27.5	1.40	nd
Big Spring Creek Fergus County	Rainbow Trout	6.9 - 11.9	nd	0.07
		12.7 - 14.0	nd	0.16
		14.2 - 16.3	nd	0.24
Bynum Reservoir Teton County	Walleye	7.7 - 11.0	0.38	nd
		14.2 - 16.9	0.56	nd
		17.5 - 19.0	0.37	nd
Canyon Ferry Reservoir Broadwater & Lewis & Clark County	Rainbow Trout	8.9 - 12.5	0.11	nd
		14.7 - 17.4	0.11	nd
		18.2 - 19.7	0.14	nd
	Yellow Perch	5.2 - 6.9	0.10	nd
		7.0 - 9.3	0.11	nd
		9.4 - 11.6	0.20	nd

⁸⁷ Montana Department of Public Health and Human Services (US) [DPHHS]. 2005 Montana Sport Fish Consumption Guidelines [online document]. Helena, MT: DPHHS, Communicable Disease Control & Prevention Bureau Food & Consumer Safety Section; 2005. Available from: <http://www.dphhs.mt.gov/fish2005.pdf>.

⁸⁸ Ibid

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg ^I	PCB
	Burbot	14.8 - 17.7	0.18	nd
	Walleye	8.8 - 16.9	0.17	nd
		17.3 - 22.2	0.34	nd
		24.6 - 27.8	0.50	nd
Clark Canyon Reservoir Beaverhead County	Rainbow Trout	11.6 - 15.9	0.08	nd
		17.0 - 19.4	0.12	nd
		20.2 - 22.8	0.16	nd
	Burbot	26.2 - 27.1	0.07	nd
Cooney Reservoir Carbon County	Rainbow Trout	7.6 - 9.2	0.07	nd2
		11.7 - 12.9	nd	nd
		12.9 - 13.7	nd	nd
	Walleye	8.8 - 13.1	0.30	nd
		16.7 - 22.2	0.39	nd
		25.6 - 27.4	0.37	nd
Crystal Lake Fergus County	Cutthroat Trout	6.0 - 10.0	0.13	nd
		10.0 - 4.0	0.16	nd
		14.0 - 18.0	0.16	nd
Flathead Lake Flathead County & Lake County	Lake Trout	18.0 - 26.7	0.33	0.08
		27.6 - 32.1	0.70	0.16
		32.2 - 38.8	0.91	0.38

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg ^I	PCB
Fort Peck Reservoir Valley, Garfield and Phillips County	Lake Whitefish	11.4 - 14.1	0.12	nd
		15.2 - 17.7	0.18	nd
		17.9 - 18.9	0.22	nd
	Walleye	8.8 - 14.9	0.28	nd
		15.1 - 20.8	0.35	nd
		21.7 - 27.3	0.58	nd
	Northern Pike	20.8 - 24.9	0.03	nd
		26.8 - 32.8	0.41	nd
		34.3 - 36.0	0.57	nd
	Lake Trout	24.7 - 28.5	0.28	nd
		28.9 - 32.0	0.53	nd
	Chinook Salmon	28.5 - 33.6	0.49	nd
Fresno Reservoir Hill County	Walleye	9.1 - 14.0	0.16	nd2
		14.5 - 17.3	0.27	nd
		>17.3	0.75	nd
Georgetown Lake Granite & Deer Lodge Counties	Brook Trout	10.7 - 12.5	0.10	nd2
		12.8 - 15.0	nd	nd
		15.8 - 15.9	nd	nd
	Kokanee	11.7 - 13.3	0.05	nd
	Kokanee	6.3 - 7.1	0.05	nd
Hauser Reservoir Lewis & Clark County	Kokanee	6.3 - 7.1	0.05	nd

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg ^I	PCB
	Rainbow Trout	11.5 - 13.0	0.05	nd
		16.9 - 20.6	0.19	nd
		10.4 - 12.1	0.10	nd
	Yellow Perch	15.9 - 17.6	nd	nd
		5.3 - 7.7	nd	nd
		8.1 - 10.1	nd	nd
Hebgen Lake Gallatin County	Brown Trout	11.1 - 14.4	0.14	nd
		11.2 - 13.8	0.17	nd
		14.7 - 17.7	0.26	nd
Holter Lake Lewis & Clark County	Kokanee	19.2 - 25.6	0.60	nd
		10.5 - 14.0	0.09	nd
		15.8 - 16.6	0.09	nd
	Rainbow Trout	19.5 - 22.1	0.38	nd
		12.6 - 13.5	0.08	nd
		14.0 - 17.5	0.07	nd
	Walleye	17.7 - 19.5	nd	nd
		12.0 - 19.5	0.25	nd
		19.7 - 24.1	0.32	0.08
		25.0 - 26.7	0.40	0.05
	Yellow Perch	8.2 - 10.0	0.19	nd

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg ^I	PCB
		10.4 - 11.9	0.26	nd
Island Lake Lincoln County	Yellow Perch	6.0 - 10.0	0.22	nd
Lake Frances Pondera County	Walleye	12.4 - 14.0	0.45	nd
		16.0 - 17.8	0.75	nd
		18.4 - 20.8	0.91	nd
Lake Koocanusa Lincoln County	Burbot	14.2 - 16.1	0.10	nd
		19.1 - 21.3	0.25	nd
	Kokanee	9.3 - 11.9	0.13	nd
		12.8 - 14.0	0.11	nd
		14.1 - 15.2	0.11	nd
Lake Mary Ronan Lake County	Rainbow Trout	13.2 - 15.2	nd	nd
		15.5 - 16.6	nd	nd
	Kokanee	8.7 - 9.7	0.22	nd
		9.9 - 10.9	0.13	nd
		10.7 - 12.0	0.13	nd
Martinsdale Reservoir Meagher & Wheatland Counties	Brown Trout	20.4 - 30.4	0.26	nd
	Rainbow Trout	9.6 - 12.2	0.11	nd
		14.8 - 16.2	0.13	nd
		16.6 - 17.0	0.12	nd
Milltown Reservoir Missoula County	Northern Pike	4.0 - 18.0	0.04	nd

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg ¹	PCB
Nelson Reservoir Phillips County	Walleye	18.0 - 22.0	0.04	nd
		22.0 - 26.0	0.04	nd
		14.0 - 17.5	0.13	nd
		19.0 - 20.6	0.16	nd
		22.1 - 23.2	0.64	nd
Park Lake Jefferson County	Walleye	24.5 - 26.0	0.67	nd
		24.0 - 26.1	0.15	nd
		6.0 - 10.0	0.01	nd
		6.0 - 10.0	0.01	nd
		10.0 - 14.0	0.01	nd
Seeley Lake Missoula County	Rainbow Trout	18.2 - 20.1	nd ²	0.06
		9.3 - 10.4	nd	nd
		10.6 - 11.1	0.08	nd
		11.2 - 11.6	0.10	nd
		12.7	1.6	— ₃
Silver Creek ⁴ (near Helena)	Cutthroat Trout Catch & Release)	17.1	3.1	—
		18.7	3.0	—
		7.5 - 11.2	0.06	nd
Swan Lake County	Kokanee	12.2 - 12.9	0.07	nd
		14.3 - 17.7	0.08	nd

Waterbody	Fish species	Size range (inches)	Conc. µg/g	
			Hg ¹	PCB
	Bull Trout	11.3 - 17.0	0.10	nd
		17.8 - 19.5	0.12	nd
		19.6 - 23.2	0.10	nd
	Northern Pike	22.0 - 25.6	0.22	nd
		38.3	0.53	nd
Tiber Reservoir (Lake Elwell) Liberty Co.	Walleye	9.5 - 10.7	0.23	nd2
		10.9 - 14.4	0.54	nd
		16.9 - 19.7	0.78	nd
Tongue River Reservoir Bighorn County	Walleye	10.2 - 12.9	0.13	nd
		16.1 - 22.5	0.26	nd
		25.0 - 26.4	0.46	nd
	Northern Pike	24.9 - 26.2	0.17	nd
		28.2 - 30.0	0.30	nd
Willow Creek Reservoir (Harrison Lake) Madison County	Rainbow Trout	8.1 - 13.4	0.06	nd
		15.2 - 17.7	0.06	nd
		17.9 - 19.3	0.08	nd
Whitefish Lake Flathead County	Lake Trout	14.8 - 18.2	0.24	nd
		19.4 - 22.7	0.32	nd
		24.0 - 26.6	0.42	0.069
	Northern Pike	26.2 - 30.1	0.32	nd2

¹Hg is the scientific abbreviation for mercury.

²“nd” means None Detected.

³Indicates that no fish were collected. Data are not available, and no consumption advice is issued.

⁴Closed to harvest; catch & release only.

In 2005, catch-and-release fishing regulations were in affect for Silver Creek because of mercury contamination. Meal guidance for fish with the level of contamination found in Silver Creek is to not eat any of the fish in Silver Creek. The source of mercury in Silver Creek is probably from the historic use of mercury to recover gold from ore taken from mines in the upper part of the drainage. Current fishing regulations do not allow fish from this stream to be harvested or eaten. This is the only fish consumption related closure in the state.

Public Water Supplies

Introduction

In 1974, Congress passed the Safe Drinking Water Act (SDWA), the first national legislation regarding drinking water. The Act, and its revisions, required the EPA to adopt regulations establishing minimum requirements for drinking water quality and treatment. Public water systems must meet these requirements before water can be served to the public for consumption. The Act also required owners of public water systems to notify their customers when violations of the regulations occur.

In response to growing concern over contamination of drinking water, Congress amended the SDWA in 1986 to significantly increase monitoring and treatment requirements. Although the 1986 amendments resolved many shortcomings in the original legislation, it became apparent that additional revisions were needed to better prioritize and address health risks associated with drinking water. In August 1996, Congress again amended the SDWA to address these issues.

Included in the 1996 amendments was a requirement that states prepare an annual compliance report (Acres) that describe the status of compliance of public water systems with the SDWA. In Montana, the DEQ implements the requirements of the SDWA under an agreement with EPA. The Public Water Supply (PWS) Section in DEQ regulates approximately 2,046 public water systems in Montana. DEQ has completed the ACR for calendar year 2004 that describes the status of compliance with the SDWA in Montana. The report lists and explains the number of violations of the requirements of the SDWA according to whether the violation was related to a drinking water standard, a water treatment requirement, or a water quality monitoring/reporting requirement. Violations are further listed according to the rule violated.

Public Water Systems in Montana

The SDWA defines a public water system as one that provides drinking water to at least 15 service connections or serves at least 25 people for at least 60 days of the calendar year. As required by the SDWA, the DEQ, PWS Section, regulates three types of public water systems:

1. Community (CWS) systems. Public water systems that serve the same resident population every day such as cities, towns, subdivisions and trailer courts;
2. Non-transient non-community (NTNC) systems. Public water systems serving the same nonresident population for at least six months of the calendar year such as schools and places of business; and
3. Transient non-community (TNC) systems. Public water systems serving a transient population such as restaurants, campgrounds, and taverns).

There are 675 active community water systems, 225 NTNC systems, and 1,163 TNC systems in Montana as of June 2005 in Montana. They serve drinking water to approximately one million people daily.

Since 1967, the Montana Water and Wastewater Operator Certification Law has required that every community public water system retain at least one individual that is fully certified and in compliance with state regulations. Similar requirements apply to operators of public wastewater treatment systems. The 1997 Montana Legislature amended this law requiring the certification of operators of NTNC public water systems beginning in July of 1998. Montana's water and wastewater system operators must have appropriate experience, pass specialized examinations, and obtain continuing education credits in order to remain fully certified.

Drinking Water Quality in Montana

Most Montana residents are privileged to have safe, potable drinking water. Many springs, wells, streams and lakes used to supply drinking water to the public receive flow from naturally protected mountain watersheds. Surface water and ground water sources are further protected against significant degradation by federal or state laws. Some surface water sources serving the public are so pristine that disinfection is the only required treatment prior to consumption. Most groundwater sources are naturally protected against contamination and used without treatment.

Because most contaminants in drinking water cannot be detected by sight or smell, owners of public water systems regularly submit water samples for extensive testing by certified laboratories. Treatment is required when natural or man-made contaminants are detected in water samples, or when sources are not adequately protected by natural barriers.

Since the original SDWA was passed in 1974, the quality of drinking water has improved dramatically in Montana and across the United States. Increasing awareness of water contamination, and the associated health effects, has often focused the public's attention on drinking water. The 1986 and 1996 amendments to the SDWA have required increasingly stringent monitoring and treatment of drinking water supplied to the public. As a result, Montana residents are supplied with drinking water from public water systems that is much safer than when the original SDWA was passed in 1974.

Drinking Water Contaminants

Contaminants found in drinking water can be grouped into four general categories:

1. **Microbiological** - contaminants are primarily disease-causing microorganisms, or microorganisms that indicate that other disease-causing organisms are present. Certain viruses, bacteria, and protozoa are disease-causing organisms that can be transmitted to humans from contaminated drinking water. Although such problems are relatively rare, serious water-borne disease outbreaks still occur in the United States from improper disposal of human or animal wastes and from inadequate treatment of drinking water. All public water systems must sample regularly for coliform bacteria. Although coliform bacteria are not always a health risk, their presence in drinking water indicates that disease-causing microorganisms may be present. Surface water sources must be carefully treated before they can be used for human consumption. Some groundwater sources are also treated for microbiological contaminants because they have been compromised by a lack of natural protection or by improper disposal of human or animal wastes.
2. **Inorganic chemicals (IOCs)** - chemicals that contain no carbon. Examples of regulated IOCs are arsenic, fluoride, lead, and nitrate. Inorganic contaminants can cause a wide variety of health effects depending upon the contaminant, the concentration, and the length of exposure. Potential health effects include toxic (poisonous) effects and cancer. High nitrate levels in drinking water can impair the transfer of oxygen to the blood in infants. High lead levels can impair intellectual development in children. Most of the inorganic Maximum Contaminant Level (MCL) violations in Montana are fluoride and nitrate violations.
3. **Organic chemicals** – chemical that contain carbon. Organic chemicals are grouped into two broad categories: volatile organic chemicals (VOCs) and synthetic organic chemicals (SOCs). VOCs can be removed from water simply by aerating or heating the water. Examples of VOCs are solvents like perchloroethylene, toluene, and xylene. SOCs must typically be removed by more complex technologies involving filtration or adsorption. Examples of SOCs are insecticides, herbicides, and polychlorinated biphenyls (PCBs). Organic contaminants can cause a wide variety of health effects depending upon the contaminant, the concentration, and the length of exposure. Potential health effects include toxic (poisonous) effects and cancer. Fortunately, very few MCL violations for VOCs and SOCs have been found in Montana.
4. **Radionuclides** - such as Radium, usually occur naturally. Radionuclides in drinking water can cause cancer or toxic effects, again depending upon the concentration and time of exposure. There are no current MCL violations for radionuclides in Montana.

Surface water systems

The most dramatic improvements in the treatment of drinking water since 1974 have been in the filtration and disinfection of surface water. Surface water is generally more susceptible to contamination than groundwater. Many surface water sources have historically been inadequately treated because of a lack of awareness regarding water-borne diseases, chemical contaminants, and the health effects associated with these contaminants. In response

to outbreaks of water-borne disease, such as giardiasis and cryptosporidiosis, knowledge and technology related to treatment of surface water have been greatly enhanced.

The primary objective in treating surface water is to remove or inactivate microbiological contaminants that can cause disease, i.e. viruses, bacteria, and protozoa. Diseases can be transmitted to humans by consuming water that has been contaminated with animal or human wastes. Adequate treatment of microbiological contaminants is essential because they can cause acute health effects. People with compromised immune systems, such as infants, the elderly, the very ill, and HIV-positive individuals, may be especially vulnerable to water-borne disease.

There are 233 public water systems in Montana that use surface water as a primary or secondary source (Figure 10). These systems include 31 systems that are served by Groundwater under Direct Influence of Surface Water (GWUDISW). These GWUDISW systems are considered to be surface water systems for the purpose of regulation. Of the 233 systems, 146 are “purchased systems,” meaning they rely on other water systems for their primary, or supplemental water supply. Although relatively few in number, the largest public water systems in Montana use surface water and they serve over 400,000 people on a daily basis.

Groundwater systems

Regular, prescriptive sampling of groundwater (GW) sources serving the public in Montana has occasionally detected unacceptable levels of microbiological, inorganic, organic, and radiological contaminants. Unfortunately, natural purification of contaminated groundwater is usually much slower than surface water. Natural “flushing” of contaminants through a groundwater aquifer can take many tens or hundreds of years. Microbiological contaminants can enter groundwater from leaking sewers and poorly constructed sewage lagoons or septic systems. Some inorganic and radiological contaminants, e.g. arsenic and radium, are naturally occurring. Most organic contaminants, e.g. solvents and pesticides, are man-made. Organic contaminants that are found in groundwater are usually the result of improper use or disposal of chemicals.

Most public water systems in Montana use groundwater as a primary or secondary source. There are 1,829 public water systems in Montana that use groundwater as their primary source (Figure 10). These groundwater sources serve over 500,000 people on a daily basis.

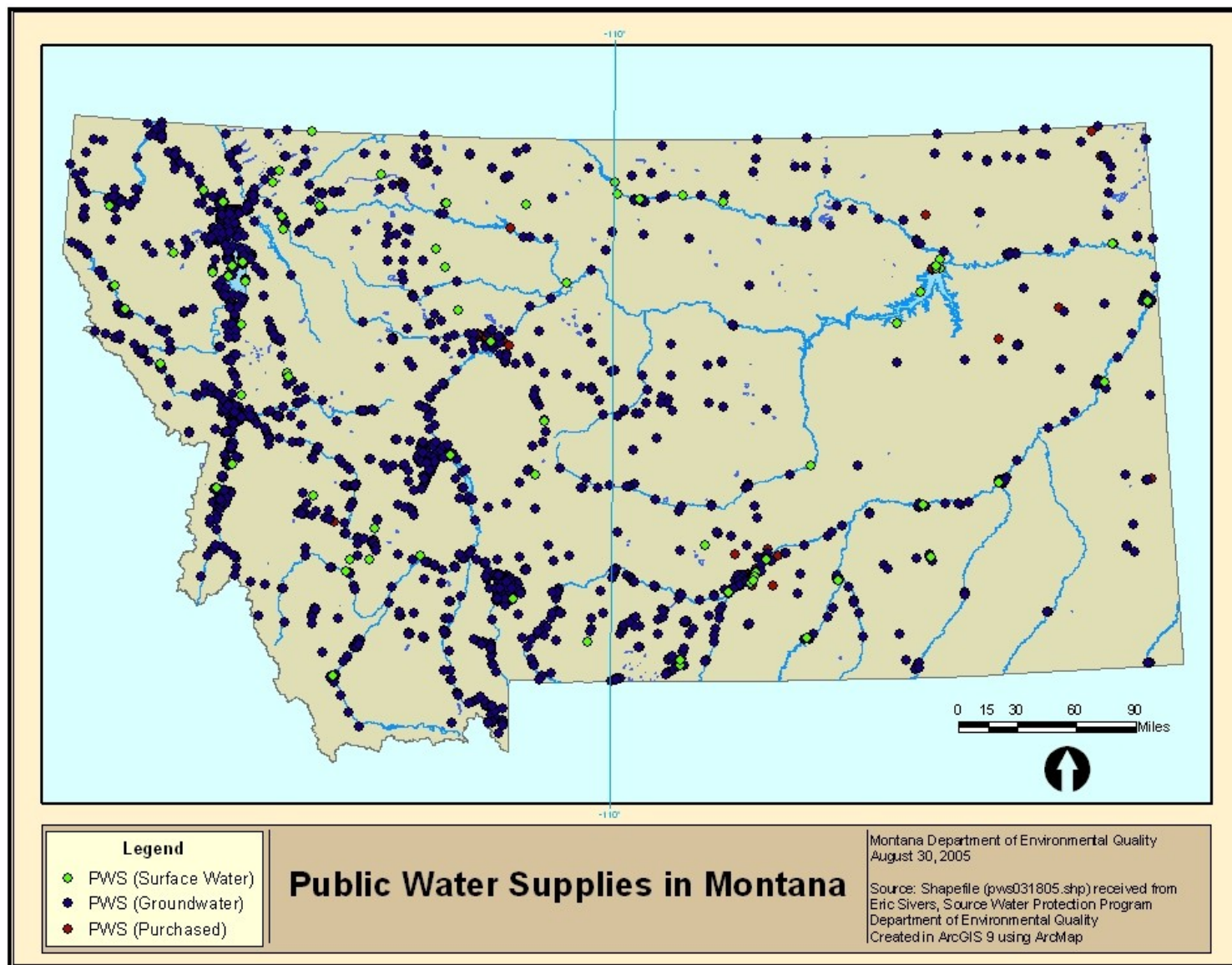


Figure 10. Distribution of Public Water Supply Sources in Montana

Regulations and Enforcement

EPA and DEQ regulations regarding water quality monitoring and water treatment have become very comprehensive and complex. Most water system owners are willing to comply with EPA and DEQ water quality monitoring regulations, but are sometimes confused by the complex nature of these regulations. Since 1989, monitoring and treatment requirements have increased significantly. In 1993, several regulations almost simultaneously became effective that imposed complex new requirements. Many monitoring violations resulted, often simply due to a lack of understanding of the regulations. In 2004, a few more regulations became effective, imposing even more requirements upon water systems.

When contaminants are detected at unacceptable levels, or when water treatment methods are found to be inadequate, owners of public water systems are required to notify the public. Appropriate corrective action is then required by DEQ to treat or abandon the affected water source(s). The public must also be notified when water samples are not taken as required.

When possible, PWS Section staff or DEQ contractors resolve violations informally with the water system. This may involve phone calls, field visits, or on-site technical assistance. Technical assistance is also often provided by Montana Rural Water Systems or the Midwest Assistance Program. Most violations are resolved informally by the willing cooperation of the water system. When violations are difficult to resolve, DEQ may initiate formal enforcement actions such as administrative orders to ensure public health protection.

Most water systems are in substantial compliance with the regulations. The largest numbers of violations were the result of late or missed water samples. The most significant public water system violations in 2004 are regarded as those resulting from inadequately treated surface water, coliform bacteria contamination, and corrosive water conditions that accelerate the leaching of lead from brass and solder in home plumbing.

All community water systems are required to provide a consumer confidence reports to the State and their users annually by July 1. These reports contain water system data for the previous calendar year. The information must reflect general system logistics; any maximum contaminant levels (MCLs), exceedences or contaminant detections; variances or exemptions; violations incurred; compliance actions taken; system updating (e.g., to treatment plants or service lines); and information on how to stay aware of their drinking water quality.

Violations in 2004

Section 1413 of the amended SDWA requires states to prepare annual compliance reports (ACRs) for public water systems. The first ACR was prepared for calendar year 1996. Subsequent ACRs are due annually on July 1. Included in the report are the following types of violations of national primary drinking water regulations:

Maximum contaminant levels (MCLs). MCLs are maximum levels of contaminants that may be present in drinking water. Federal and state regulations regard drinking water that contains contaminants at levels below the MCLs as safe for human consumption.

- ☐ Treatment requirements. Treatment requirements are imposed when MCLs are exceeded, or when natural protection against contamination is inadequate to ensure safe drinking water without treatment.
- ☐ Variances and exemptions. Variances may be issued by DEQ when treatment has been installed, but has not been effective in meeting MCLs. Variances impose further requirements for meeting the MCL, or for installing alternative treatment. Exemptions are issued to simply allow additional time to meet an MCL or treatment requirement. DEQ must consider public health impacts and affordability when variances and exemptions are issued. In addition to imposing deadlines for making system improvements, variances and exemptions impose requirements for public notification. No violations of variances or exemptions were recorded in 2004.
- ☐ Monitoring requirements. As previously discussed, new regulatory requirements include extensive water sampling and testing requirements. Violations are created when water is not sampled or when results of tests are not submitted. Most monitoring violations are resolved when sampling is resumed and public notice is posted, or when late reports are submitted.

- ☐ Reporting requirements. All community water systems are required to provide a consumer confidence report to the State and its users each year. The supplier remains in violation until they appropriately distribute the report.

Below are tables that include the above violation information for the specific regulations adopted by EPA for 2004. These regulations are the Phase 2 and Phase 5 (Phase 2/5) Rules, the Total Coliform Rule (TCR), the Surface Water Treatment Rule (SWTR), the Disinfection Byproducts Rule (DBP), the Lead and Copper Rule (LCR), the Radionuclides Rule, and the Consumer Confidence Report Rule.

Phase 2/5 Rule

Table 24 shows the violations of MCLs and monitoring requirements for synthetic organic chemicals (SOCs), volatile organic chemicals (VOCs), inorganic chemicals (IOCs), and for nitrate/nitrite in calendar year 2004. Monitoring frequency for VOCs, IOCs, SOCs, and nitrates/nitrites for community and non-transient non-community public water systems varied widely in calendar year 2004. Owners of all public water systems were required to sample for nitrate in 2004.

There were no systems with MCL violations for VOCs and one system with a violation for SOCs. Three systems had MCL violations for IOCs. Twelve systems violated the MCL for nitrate. Most of these violations are associated with naturally occurring contaminants, but some of the nitrate violations may be the result of contamination from improper sewage disposal or agricultural practices.

Three water systems were in violation of the monitoring requirements for VOCs, 138 for SOCs, 96 for IOCs, and 307 for nitrate. VOC and IOC monitoring violations included monitoring requirements due by the end of calendar year 2004. Monitoring violations resulted from late samples, missed samples, improper sampling procedures, or confusion over complex monitoring requirements. Most of the PWS that received nitrate-monitoring violations simply failed to mail their sample results to DEQ.

Table 24. Violations of the Phase 2 and Phase 5 Rules

SDWIS Codes	Phase II and Phase V	MCL (mg/l)	MCLs		Significant Monitoring/Reporting	
			Number Of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
	VOCs		0	0	63*	3
	SOCs		1	1	862*	138
	IOCs		4	3	101*	96
	NO ₃ /NO ₂	10	19	12	347	307
	Subtotal		24	16	1373	544

* Individual violations, per analyte. Many analytes are in the VOC, SOC, and IOC monitoring groups. There may also be many violations per year because there are up to four quarters in which violations could occur. Therefore, the numbers of violations are multiplied by the number of analytes in the monitoring groups and/or the number of monitoring periods per year.

Total Coliform Rule

Table 25 shows the violations of the MCLs and monitoring requirements for TCR. In 2003, 149 public water systems exceeded the Maximum Contaminant Level (MCL violations) for total coliforms. Ten MCL violations resulted when a routine or one of the repeat samples showed the presence of fecal coliform bacteria. Fecal coliforms are a specific subgroup of total coliforms that grow only at body temperature of warm-blood animals. They are used to indicate if fecal contamination of water is more likely to have recently occurred.

There are two types of TCR MCL violations: (1) a Boil Water Order is an acute MCL violation and is issued if there are coliform bacteria with fecal contamination, and (2) a Health Advisory is a non-acute MCL violation that is issued when a system has coliform bacteria but no fecal contamination is found. The MCLs are based on a system's routine and repeat samples. Inadequately protected water sources, or growths of bacteria are common reasons for MCL violations.

Four hundred thirty three water systems were in violation of the routine monitoring requirements in 2004. The violations that occurred resulted from systems not submitting monthly or quarterly samples.

Table 25. Violations of the Total Coliform Rule

SDWIS Codes	Total Coliform Rule	MCL	MCLs		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
21	Acute MCL Violation	Fecal Coliform Bacteria Present	10	10		
22	Non-Acute MCL Violation	No Fecal Coliform Bacteria Present	168	142		
23, 24	Routine Monitoring				947	433
	Subtotal		178	149	947	433

Surface Water Treatment Rule

Table 26 shows the violations of the treatment technique requirements (filtration and disinfection) and of the monitoring requirements of the SWTR. Four water systems failed to meet treatment technique requirements, and three failed to install filtration treatment as required by DEQ. Treatment technique violations are typically the result of inadequate filtration or disinfection when water quality or water demands are extreme.

Table 26. Violations of the Surface Water Treatment Rule

SDWIS Codes	Surface Water Treatment Rule	Treatment Techniques		Significant Monitoring/Reporting	
		Number Of Violations	Number Of Systems With Violations	Number Of Violations	Number Of Systems With Violations
	Filtered Systems				
36	Monitoring, Routine/Repeat			19	11
41	Treatment Techniques	18	5		
	Unfiltered Systems				
01	Turbidity MCL Single			0	0
02	Turbidity MCL Average			0	0
03	Turbidity Significant M/R			0	0
31	Monitoring, Routine/Repeat			3	1
42	Failure To Filter	4	3		
	Subtotal	22	8	22	12

Disinfection Byproducts Rule

Stage 1 Disinfections Byproducts Rule went into effect on January 1, 2002 for surface water systems and groundwater systems under the direct influence of surface water serving populations equal to or greater than 10,000. Surface water systems and groundwater systems under the direct influence of surface water serving less than 10,000

people, and all groundwater systems, must comply with this rule effective January 1, 2004. There are currently 363 systems monitoring under this rule 96 of which violated the monitoring and reporting requirement in 2004 (Table 27).

Table 27. Violations of the Disinfection Byproducts Rule

SDWIS codes	Disinfection Byproducts Rule	MCL	MCLs		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
27	Monitoring, Routine/Repeat				439	96
11	Chlorine (0999) or Chloramines (1006) MRDL	4.0 mg/l	0	0		
11	Chlorine Dioxide M&R				0	0
02	DBP MCL Average (Total TTHMs, 2950)	0.50 ug/l	0	0		
02	DBP MCL Average (Total HAA5s, 2456)	0.10 ug/l	0	0		
	Subtotal		0	0	439	96

Lead and Copper Rule

Table 28 shows monitoring and treatment technique violations of the LCR. No water systems violated the treatment technique requirements in 2004. Two Hundred Ninety-Nine water systems violated the LCR monitoring requirements in 2004. Most of the violations resulted from late or missed samples or from confusion over complex monitoring requirements. No systems failed to provide required educational materials to the public regarding lead exceedences, or failed to notify DEQ that they had provided the required public education materials.

Table 28. Violations of the Lead and Copper Rule

SDWIS Codes	Lead and Copper Rule	Treatment Techniques		Significant Monitoring/Reporting	
		Number of Violations	Number of Systems with Violations	Number of Violations	Number of Systems with Violations
51	Initial lead and copper tap M/R			436*	150
52	Follow-up or routine lead and copper tap M/R			276	162
58, 62	Treatment Installation	0	0		
65	Public Education	0	0		
	Subtotal	0	0	712	299

* Individual violations, per analyte. Code 51 violations could include two violations per year because there are two 6-month periods in which violations could occur. Therefore, the number of violations is multiplied by the number of monitoring periods per year.

Radionuclide Rule

Only community water systems must sample for radionuclides every four years until changes to the rule take effect on December 7, 2003. At that time schedules were adjusted accordingly to three, six, or nine-year compliance periods based on the historical data and/or the results received during the initial monitoring period. No water systems exceeded the MCL during 2004 (Table 29).

Table 29. Violations of the Radionuclide Rule

SDWIS Codes	Radionuclide MCLs	MCL (pci/l)	MCLs		Significant Monitoring/Reporting	
			Number Of Violations	Number Of Systems With Violations	Number Of Violations	Number Of Systems With Violations
4000	Gross Alpha	15 pCi/l	0	0	0	0
	Subtotal		0	0	0	0

Consumer Confidence Report Rule

Only community water systems must comply with the Consumer Confidence Report Rule. Fifty-three systems did not meet the requirements of this rule for the compliance year of 2003 nor had open violations from previous years (Table 30).

Table 30. Violations of the Consumer Confidence Report Rule

SDWIS codes	Consumer Confidence Report Rule	Significant Monitoring/Reporting	
		Number of Violations	Number of Systems with Violations
71	Consumer Notification	53	33
	Subtotal	53	33

Summary and Conclusions

The violations referenced in the previous sections occurred during the period between 1/1/2004 and 12/31/2004 and may have been followed with enforcement or assistance actions by DEQ. Typical enforcement actions include follow-up phone calls, violation notification letters, administrative orders, violation, and closure/resolution actions. There are currently no Variances or Exemptions (as defined by the Act) in effect in Montana.

Montana DEQ adopted the EPA's Safe Drinking Water Information System (SDWIS) for maintaining regulatory and compliance monitoring data in a modernized format in 2000. Since then, SDWIS modernization has positively affected DEQ's ability to detect and respond to violations. The improvement in DEQ's ability to detect violations also improves DEQ's ability to respond to violations. This trend will result in improved compliance over time.

A significant portion of the violations were a result of an incomplete understanding of the requirements, or were technical violations that did not result in public health risks. However, more attention must be devoted to reducing the number of violations.

The Public Water Supply Section in DEQ continuously coordinates efforts with owners of public water systems to address the most significant violations. The most serious public health risks receive the highest priority. The DEQ notifies water systems when violations occur, and are informed of corrective measures necessary to return to compliance. The PWS Section works with DEQ's Enforcement Division when necessary to return difficult violators to compliance through formal enforcement actions.

The Planning and Prevention Division at DEQ implemented a new program in 1997 to make low interest loans to owners in need of water system improvements. Many systems have taken advantage of this funding program, and the DEQ anticipates that many noncompliance issues will be addressed using these loans. Questions regarding this program may be directed to the Technical and Financial Assistance Bureau, Planning and Prevention Division, DEQ, P.O. Box 200901, Helena, MT 59620-0901, phone (406) 444-6697.

Source Water Protection Program**Introduction**

Montana is required under provisions of the 1996 federal Safe Drinking Water Act to carry out a Source Water Assessment Program (SWAP). The U.S. Environmental Protection Agency formally approved the Montana program in November 1999. The program was developed to the greatest extent possible using public participation and input from public water supplies (PWS) and other stakeholders interested in SWP issues.

The Montana SWP Program is intended to be a practical and cost-effective approach to protect public drinking water supplies from contamination. The major components of the Montana SWP Program are the processes of delineation and assessment. Delineation is a process of identifying areas that contribute water to aquifers or surface waters used for drinking water, called SWP areas. Geologic and hydrologic conditions are evaluated in order to delineate SWP areas. Assessment involves identifying businesses, activities, or land uses in SWP areas where certain contaminants are generated, used, stored, transported, or disposed, and then determining the potential for contamination from these sources.

The emphasis of delineation and assessment is identifying significant threats to drinking water supplies and providing public water supplies with the information they need to protect their source(s) of water. In Montana, implementation of the source water assessment program is based on a watershed approach that: 1) identifies SWAP implementation priorities within each major watershed, 2) assigns oversight responsibilities to program staff for source water assessments within each of the major watersheds, 3) tracks program implementation within each watershed.

Authority, Funding, and Program Requirements

Authority

The federal Safe Drinking Water Act requires that each state with primacy to assess the source water of every public water system. Additionally, the Montana Source Water Protection Program adopted the goals stated in the Montana Constitution and the Montana Water Quality Act. The constitution states: "The state and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations... [including] the protection of the environmental life support system from degradation..."(Article IX, Section 1). Further, the Montana Water Quality Act states: "It is the policy of this state to conserve water by protecting, maintaining, and improving the quality and potability of water for public water supplies..."(Montana Code Annotated (MCA) 75-5-101).

Funding

A one-time set-aside from the State Revolving Fund (SRF) initially funded much of the SWAP. This set-aside was approximately \$1.5 million dollars (10% of the FY1997 capitalization grant dollars). Drinking Water State Revolving Fund (DWSRF) set-asides earmarked specifically for wellhead and source water protection have provided subsequent funding to the program.

Program requirements

Section 1453 of the Safe Drinking Water Act (42 U.S.C. § 300j-13) requires the state program to:

- ☐ Identify the source(s) of water used by PWSs. This process delineates capture zones for wells, or a stream buffer area for surface water sources called the SWP area.
- ☐ Identify and Inventory Potential Contaminant Sources. Regulated contaminants of concern in Montana generally include nitrate, microbial contaminants, solvents, herbicides, pesticides, and metals. Potential sources of these types of contaminants include septic systems, animal feeding operations, underground storage tanks, floor drains, sumps, and certain land use activities.
- ☐ Assess the susceptibility of the PWS to those identified potential contaminant sources. A susceptibility assessment considers the hazard rating of a potential contaminant source and potential barriers to evaluate the likelihood that a spill or release would reach the well or intake. A determination of susceptibility is made for each identified potential contaminant source within the SWP area.
- ☐ Make the results of the delineation and assessment available to the public. Source water assessments must be made available to the public. Different resources will be used to bring this information to the public including consumer confidence reports, SWP Internet site, posting at public libraries, posting at local health department, and others.

Source Water Assessment Implementation

Beginning in 1999, the Source Water Protection section staff of hydrogeologists assigned priority ratings to PWSs based on source water sensitivity. The assessment process was biased towards completion of high priority community systems, followed by the moderate, and then the low priority systems. The watershed approach allowed the SWP section to use student interns to complete non-community system assessment reports. Student interns completed reports in a given watershed, using the hydrogeologic model provided by a SWP hydrogeologist.

Montana has over 2,200 PWSs, and the EPA granted an extension to the period allotted for the assessment program. The SWP Section anticipates effective completion of assessments by the end of FY2006. Completion is qualified as 'effective' as the PWS roster is dynamic. New systems will come online, and inactive systems may be reactivated.

As of August 2005, source water assessments in Montana are 81.6% completed. Assessments in the Lower Missouri watershed are effectively complete (99.5%). Assessments in the Yellowstone watershed are nearly complete (94.4%). The Upper Missouri watershed is 87.7% complete. The westslope watershed includes the largest fraction of Montana's PWSs, and assessment in this watershed is 70.3% complete as of August 2005. Staff assigned to completed watersheds have begun to both share the workload in the other watersheds, and transition to SWP implementation.

Drinking Water State Revolving Fund**Introduction**

The 1995 Montana Legislature created the Drinking Water State Revolving Fund (DWSRF) with the passage of HB493. In 1997, the Legislature amended the program with HB483 to make Montana law consistent with the reauthorization of the Safe Drinking Water Act passed in 1996. This legislation, now codified as MCA 75-6-201, et seq., authorizes the DEQ and the Department of Natural Resources and Conservation (DNRC) to develop and implement the program, and it established the DWSRF Advisory Committee.

The Advisory Committee consists of one state representative, one state senator, one member representing the Montana League of Cities and Towns, one county commissioner representing the Montana Association of Counties, one representative from DNRC, and one representative from DEQ. The Committee advises DEQ and DNRC on policy decisions that arise in developing and implementing the DWSRF and it reviews the program's Intended Use Plan (IUP). The DEQ and DNRC administer the DWSRF, which is similar to the Water Pollution Control SRF.

The EPA approved and awarded the DWSRF Program its first capitalization grant on June 30, 1998 for the 1997 fiscal year (FY). Since awarding its first capitalization grant to DEQ in 1998, the EPA has awarded the DEQ capitalization grants through the FY2005.

The program offers below-market loans for construction of public health-related infrastructure improvements as well as provides funding for other activities related to public health and compliance with the Safe Drinking Water Act (SDWA). These other activities, or set-asides, include administration of the DWSRF program, technical assistance to small communities, as well as financial and managerial assistance, source water assessment and delineation, operator certification and assistance with administration of activities in the Public Water Supply Program (PWSP).

As the primacy agency responsible for implementation of the SDWA, DEQ is also responsible for the oversight of the SRF Program. This role consists primarily of providing technical expertise, while DNRC provides financial administration of project loans and oversees the sale of state general obligation bonds. The majority of the funds for this program come to Montana in the form of capitalization grants through the EPA. Montana provides the required twenty-percent matching funds by issuing state general obligation bonds. The program uses the interest on the project loans to pay the general obligation bonds, thus using no state general funds to operate the program. The program uses repaid principal on the project loans for rebuilding the DWSRF fund and to fund additional projects in the future. The federal capitalization grants were only authorized through federal fiscal year 2003; however, congress continues to appropriate funding for the program. Federal and state law requires the DWSRF to be operated by the state in perpetuity.

The 1996 Amendments to SDWA include requirements for each state to prepare an annual Intended Use Plan (IUP) for each capitalization grant application. This is the central component of the capitalization grant application, and describes how the state will use the DWSRF to meet SDWA objectives and further the protection of public health. The IUP contains the following elements:

- ☐ Priority list of projects, including description and size of community.
- ☐ Criteria and method used for distribution of funds.
- ☐ Description of the financial status of the DWSRF Program.
- ☐ Short- and long-term goals of the Program.
- ☐ Amounts of funds transferred between the DWSRF and the Wastewater SRF.
- ☐ Description of the set-aside activities and percentage of funds, that will be used from the DWSRF capitalization grant, including DWSRF administrative expenses allowance, PWSP support and technical assistance.
- ☐ Description of how the program defines a disadvantaged system and the amount of DWSRF funds that will be used for this type of loan assistance.

Anticipated Funding List

DEQ became eligible to apply for the fiscal year (FY) 2005 federal capitalization grant on October 1, 2004, and applied for this grant and the balance of the FY04 grant. The DEQ anticipates that we will also apply for the federal FY06 capitalization grant

The DWSRF program anticipates 20 projects will be funded with in federal FY04 and 05, and previous capitalization grants, in conjunction with the 20 % state match (Table 31). This list represents those projects most likely to proceed, starting from the highest ranked projects on the state's comprehensive priority list. It is possible that, if other projects are ready to proceed before those on this list, the actual projects that the DWSRF program ultimately funds may vary from those indicated on this list. This did occur during calendar years 1998, 1999, 2000, 2001, 2003, and 2004. The DEQ expects this to happen again due to the high variability in project schedules, needs, and other funding sources.

Table 31. DWSRF Anticipated Funding List for FY2004 - 2005

Project	Population	Project Cost	Project Type
1. Thompson Falls	1,321	\$1,500,000	Water treatment plant improvements - refinance.
2. Upper/Lower River Road WD	1,075	\$938,000	Distribution system and connection to City of Great Falls water system.
3. Three Forks	1,728	\$220,000	Water treatment plant facilities.
4. Worden-Ballentine	852	\$946,000	New well, pump-house, disinfection, and telemetry controls.
5. Dry Prairie Reg. Water System	35,551	\$230,000,000	Continue construction of extensive distribution system (expected SRF portion approx. \$10 million; SFY06 amount: \$400,000).
6. Helena	25,780	\$3,100,000	Water system/distribution system improvements, meters.
7. Lockwood W&SD	6,500	\$1,000,000	Water treatment improvements (pre-sedimentation basins).
8. Billings	89,847	\$11,300,000	Water treatment plant improvements.
9. Miles City	8,487	\$1,000,000	Storage reservoir replacement.
10. Charlo WD	350	\$100,000	New well and transmission main.
11. Power-Teton W&SD	167	\$370,000	New storage reservoir, pre-sedimentation basin, distribution improvements, appurtenances, controls.
12. Livingston	6,851	\$744,000	Distribution system improvements.
13. Froid	195	\$250,000	Refinance existing debt.
14. Medicine Lake	269	\$250,000	Refinance existing debt.
15. Plentywood	2,061	\$870,000	Distribution system improvements.

Criteria and Method Used for Distribution of Funds

The SDWA amendments of 1986 and 1996 imposed many new regulatory requirements upon public water suppliers. Public health and compliance problems related to these requirements, affordability, consolidation of two or more systems, and readiness to proceed all were considered in developing Montana's project ranking criteria.

DEQ initially proposed balancing these factors, with slightly more emphasis placed on health and compliance and less on affordability and readiness to proceed. In discussions with EPA and with our state's Drinking Water SRF Advisory Committee, it became clear that health risks and compliance issues needed to be given even more emphasis, and that readiness to proceed could be eliminated and handled through by-pass procedures.

Projects addressing acute and immediate public health risks, such as inadequately treated surface water, are given high scores. Proposals that would address lower risk public health threats, such as chemical contaminants present at low levels, are ranked slightly lower. Proposals that are intended to address existing or future regulatory requirements before noncompliance occurs, also are given credit, but are ranked lower than projects with significant health risks.

The DWSRF program also considers the financial impact of the proposed project on the system users as one of the ranking criteria. The DWSRF awards points under affordability criterion to communities most in need of low interest loans to fund the project.

In addition to the limitations on financing for individual projects discussed earlier in this plan, DEQ is required annually to use at least 15 percent of all funds credited to DWSRF account to provide loan assistance to systems serving fewer than 10,000 people, to the extent there are a sufficient number of eligible projects to fund.

Financial Status

The discussion and tables on the following pages summarize the DWSRF expenditures to date and outline financial projections and assumptions for the future. The individual capitalization grants and corresponding state match for each fiscal year are listed below (Table 32).

Table 32. Summary of DWSRF Grants from 1997 - 2005

Federal FY	Federal Grant	State Match
1997	\$14,826,200	\$2,965,240
1998	\$7,121,300	\$1,424,260
1999	\$7,463,800	\$1,492,760
2000	\$7,757,000	\$1,551,400
2001	\$7,789,100	\$1,557,820
2002	\$8,052,500	\$1,610,500
2003	\$8,004,100	\$1,600,820
2004	\$8,303,100	\$1,660,620
2005	\$8,285,500	\$1,657,100
TOTAL	\$77,602,600	\$15,520,520

A financial overview of the DWSRF through state fiscal year 2007 shows the actual income and expenses (or inflows and outflows), by broad category, to the DWSRF through state fiscal year 2004 and the projected inflows and outflows through state fiscal year 2007 (Table 33). The first column lists broad categories of inflows and outflows and the second column lists actual amounts for those categories through state fiscal year 2004, including projected amounts through 2005. The third column lists projected amounts for state fiscal year 2006.

Table 33. Drinking Water Revolving Fund Program Status

Source of Funds	Projected thru SFY 2005	Projected for SFY 2006	Total
Federal Capitalization Grants	\$77,602,600	\$8,285,500*	

Source of Funds	Projected thru SFY 2005	Projected for SFY 2006	Total
Set-Asides	{ \$9,632,220 }	{ \$1,311,420 }	
Total to Loan Fund	\$67,970,380	\$6,974,080	\$74,944,460
State Match			
Bond Proceeds	\$15,520,520	\$1,657,100	\$17,177,620
Loan Loss Reserve Sweeps	\$1,192,053	\$400,000	\$1,592,053
Loan Repayments	\$6,000,000	\$2,500,000	\$8,500,000
Interest on Fund Investments	~\$2,500,000	~\$100,000	\$2,600,000
Transfers from CWSRF	\$8,782,486		\$8,782,486
TOTAL SOURCE OF FUNDS			\$113,596,619
Use of Funds			
Loans Executed			
Direct Loans	\$64,851,604		\$64,851,604
Transfer to CWSRF	\$6,130,213	\$5,000,000	\$11,130,213
TOTAL USES			\$75,981,817
Funds Available for Loan			\$37,614,802
Projected IUP Loans			
Direct Loans (SFY06)		\$26,288,000	\$26,288,000
Future Potential Projects (SFY07)			\$15,492,775
PROJECTED BALANCE REMAINING			(\$4,165,973)

*FFY06 capitalization grant estimated amount